



IBM Mobile Systems
ThinkPad Computer
Hardware Maintenance Manual

July 2003

This manual supports: ThinkPad G40

Note

Before using this information and the product it supports, be sure to read the general information under “Notices” on page 129.

First Edition (July 2003)

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Contents

Chapter 1. About this manual	1
Chapter 2. Introduction	3
Important service information	3
Strategy for replacing FRUs	3
How to use error messages	4
Diskette compatibility matrix	4
Safety notices: multilingual translations	5
Safety information	17
General safety	17
Electrical safety	18
Safety inspection guide	20
Handling devices that are sensitive to electrostatic discharge	21
Grounding requirements	22
Laser compliance statement	22
Chapter 3. General descriptions	25
Read this first	25
What to do first	25
Related service information	28
Service Web site	28
Restoring the preloaded system	28
Passwords	30
Power management	33
Checkout guide	35
Testing the computer	35
Detecting system information with PC-Doctor	37
Power system checkout	37
Chapter 4. ThinkPad G40	41
Product overview	43
Specifications	43
Status indicators	45
FRU tests	47
Fn key combinations	49
Symptom-to-FRU index	50
Numeric error codes	50
Error messages	54
Beep symptoms	55
No-beep symptoms	55
LCD-related symptoms	56
Intermittent problems	57
Undetermined problems	57
FRU replacement notices	58
Screw notices	58
Retaining serial numbers	59
Removing and replacing a FRU	61
1010 Battery pack	62
1020 Hard disk drive	63

1030 DIMM door	65
1040 DIMM	66
1050 Modem daughter card (MDC)	67
1060 Backup battery	68
1070 Keyboard	69
1080 Middle cover	71
1090 Hinge cover	72
1095 FDD assembly	73
1100 CD-ROM/DVD drive	74
1110 Mini PCI adapter	75
1115 PC card slot assembly	76
1120 LCD and Keyboard bezel assembly	79
1125 LCD assembly	81
1130 Keyboard bezel	83
1140 Fan assembly	85
1145 Fan (CPU 3 GHz) and CPU fixture	87
1150 CPU	89
1160 CD-ROM/DVD drive bracket	90
1170 FDD bracket.	91
1180 System board	92
1190 Lower case assembly	93
1195 Modem cable	94
2000 PC card slot assembly.	95
2010 LCD front bezel.	96
2020 Inverter card	97
2030 Speaker assembly	98
2040 LCD cable assembly	99
2045 Wireless antenna and rear cover	101
2050 LCD panel and hinge assembly	102
Locations	103
Front view	103
Rear view.	104
Bottom view	105
Parts list	106
G40 series	106
Overall.	113
LCD FRUs	118
Keyboard	120
Recovery CDs	121
Miscellaneous parts	124
AC adapters	124
Telephone cable	125
Optional FRUs	126
Common parts list	127
Notices	129
Trademarks	129

Chapter 1. About this manual

This manual contains service and reference information for IBM ThinkPad G40 product. Use this manual along with the advanced diagnostic tests to troubleshoot problems.

The manual is divided into sections as follows:

- The common sections provide general information, guidelines, and safety information required in servicing computers.
- The product-specific section includes service, reference, and product-specific parts information.

Important

This manual is intended for trained service personnel who are familiar with ThinkPad products. Use this manual along with the advanced diagnostic tests to troubleshoot problems effectively.

Before servicing an IBM ThinkPad product, be sure to review the safety information under “Safety notices: multilingual translations” on page 5, “Safety information” on page 17, and “Laser compliance statement” on page 22.

Chapter 2. Introduction

Important service information

Important

Software (i.e., BIOS and device driver) fixes are customer-installable. The BIOS and device drivers are posted on the IBM support site
<http://www.ibm.com/pc/support>

Advise customers to contact the PC Company HelpCenter at 800-772-2227 if they need assistance in obtaining or installing any software fixes.

Customers in Canada should call IBM HelpPC at 800-565-3344 for assistance or download information.

Strategy for replacing FRUs

Before replacing parts

Make sure that all software fixes are installed before replacing any FRUs listed in this manual.

Use the following strategy to prevent unnecessary expense for replacing and servicing FRUs:

- **If you are instructed to replace a FRU but the replacement does not correct the problem, reinstall the original FRU before you continue.**
- Some computers have both a processor board and a system board. If you are instructed to replace either the processor board or the system board, and replacing one of them does not correct the problem, reinstall that board, and then replace the other one.
- If an adapter or device consists of more than one FRU, any of the FRUs may be the cause of the error. Before replacing the adapter or device, remove the FRUs, one by one, to see if the symptoms change. Replace only the FRU that changed the symptoms.

Attention: The setup configuration on the computer you are servicing may have been customized. Loading Setup Defaults or replacing the system board may alter the settings. Note the current configuration settings (using the BIOS Setup Utility); then, when service has been completed, verify that those settings remain in effect.

Strategy for replacing a hard disk drive

Always try to run a low-level format before replacing a hard disk drive.

Attention: The drive startup sequence in the computer you are servicing may have been changed. Be extremely careful during write operations such as copying, saving, or formatting. If you select an incorrect drive, data or programs can be overwritten.

How to use error messages

Use the error codes displayed on the screen to diagnose failures. If more than one error code is displayed, begin the diagnosis with the first error code. Whatever causes the first error code may also cause false error codes. If no error code is displayed, see if the error symptom is listed in the Symptom-to-FRU Index for the computer you are servicing.

Diskette compatibility matrix

The compatibility of each of the drives with the diskettes for it is as follows:

Diskette drive	Diskette capacity	Compatibility
3.5-inch	1.0 MB	Read and write
	2.0 MB	Read and write
	4.0 MB	Not compatible

Safety notices: multilingual translations

In this manual, safety notices appear in English with a page number reference to the appropriate multilingual, translated safety notice found in this section.

The following safety notices are provided in English, French, German, Hebrew, Italian, and Spanish.

Safety notice 1

Before the computer is powered-on after FRU replacement, make sure all screws, springs, and other small parts are in place and are not left loose inside the computer. Verify this by shaking the computer and listening for rattling sounds. Metallic parts or metal flakes can cause electrical shorts.

Avant de remettre l'ordinateur sous tension après remplacement d'une unité en clientèle, vérifiez que tous les ressorts, vis et autres pièces sont bien en place et bien fixées. Pour ce faire, secouez l'unité et assurez-vous qu'aucun bruit suspect ne se produit. Des pièces métalliques ou des copeaux de métal pourraient causer un court-circuit.

Bevor nach einem FRU-Austausch der Computer wieder angeschlossen wird, muß sichergestellt werden, daß keine Schrauben, Federn oder andere Kleinteile fehlen oder im Gehäuse vergessen wurden. Der Computer muß geschüttelt und auf Klappergeräusche geprüft werden. Metallteile oder-splinter können Kurzschlüsse erzeugen.

לפני הפעלת המחשב לאחר החלפת FRU יש לוודא שכל הברגים, הקפיצים, וחלקים קטנים אחרים נמצאים במקומם ואינם חופשיים לזוז בתוך המחשב. כדי לוודא זאת, יש לטלטל את המחשב ולהקשיב לגילוי קולות שקשוק. חלקי או שבבי מתכת עלולים לגרום לקצרים חשמליים.

Prima di accendere l'elaboratore dopo che é stata effettuata la sostituzione di una FRU, accertarsi che tutte le viti, le molle e tutte le altre parti di piccole dimensioni siano nella corretta posizione e non siano sparse all'interno dell'elaboratore. Verificare ciò scuotendo l'elaboratore e prestando attenzione ad eventuali rumori; eventuali parti o pezzetti metallici possono provocare cortocircuiti pericolosi.

(continued)

(continuation of safety notice 1)

Antes de encender el sistema despues de sustituir una FRU, compruebe que todos los tornillos, muelles y demás piezas pequeñas se encuentran en su sitio y no se encuentran sueltas dentro del sistema. Compruébelo agitando el sistema y escuchando los posibles ruidos que provocarían. Las piezas metálicas pueden causar cortocircuitos eléctricos.

Safety notice 2**DANGER**

Some standby batteries contain a small amount of nickel and cadmium. Do not disassemble a standby battery, recharge it, throw it into fire or water, or short-circuit it. Dispose of the battery as required by local ordinances or regulations. Use only the battery in the appropriate parts listing. Use of an incorrect battery can result in ignition or explosion of the battery.

Certaines batteries de secours contiennent du nickel et du cadmium. Ne les démontez pas, ne les rechargez pas, ne les exposez ni au feu ni à l'eau. Ne les mettez pas en court-circuit. Pour les mettre au rebut, conformez-vous à la réglementation en vigueur. Lorsque vous remplacez la pile de sauvegarde ou celle de l'horloge temps réel, veillez à n'utiliser que les modèles cités dans la liste de pièces détachées adéquate. Une batterie ou une pile inappropriée risque de prendre feu ou d'exploser.

Die Bereitschaftsbatterie, die sich unter dem Diskettenlaufwerk befindet, kann geringe Mengen Nickel und Cadmium enthalten. Sie darf nur durch die Verkaufsstelle oder den IBM Kundendienst ausgetauscht werden. Sie darf nicht zerlegt, wiederaufgeladen, kurzgeschlossen, oder Feuer oder Wasser ausgesetzt werden. Die Batterie kann schwere Verbrennungen oder Verätzungen verursachen. Bei der Entsorgung die örtlichen Bestimmungen für Sondermüll beachten. Beim Ersetzen der Bereitschafts- oder Systembatterie nur Batterien des Typs verwenden, der in der Ersatzteilliste aufgeführt ist. Der Einsatz falscher Batterien kann zu Entzündung oder Explosion führen.

(continued)

(continuation of safety notice 2)

סוללות המתנה מסוימות מכילות כמות קטנה של ניקל וקדמיום. אין לפרק סוללת המתנה, לטעון אותה מחדש, להשליך אותה לאש או למים או לקצר אותה. יש לסלק את הסוללה כנדרש על ידי התקנות והחוקים המקומיים. יש להשתמש רק בסוללה המופיעה ברשימת החלקים המתאימה. שימוש בסוללה לא מתאימה עלול לגרום להצתה או התפוצצות של הסוללה.

Alcune batterie di riserva contengono una piccola quantità di nichel e cadmio. Non smontarle, ricaricarle, gettarle nel fuoco o nell'acqua né cortocircuitarle. Smaltirle secondo la normativa in vigore (DPR 915/82, successive disposizioni e disposizioni locali). Quando si sostituisce la batteria dell'RTC (real time clock) o la batteria di supporto, utilizzare soltanto i tipi inseriti nell'appropriato Catalogo parti. L'impiego di una batteria non adatta potrebbe determinare l'incendio o l'esplosione della batteria stessa.

Algunas baterías de reserva contienen una pequeña cantidad de níquel y cadmio. No las desmonte, ni recargue, ni las eche al fuego o al agua ni las cortocircuite. Deséchelas tal como dispone la normativa local. Utilice sólo baterías que se encuentren en la lista de piezas. La utilización de una batería no apropiada puede provocar la ignición o explosión de la misma.

Safety notice 3



The battery pack contains small amounts of nickel. Do not disassemble it, throw it into fire or water, or short-circuit it. Dispose of the battery pack as required by local ordinances or regulations. Use only the battery in the appropriate parts listing when replacing the battery pack. Use of an incorrect battery can result in ignition or explosion of the battery.

La batterie contient du nickel. Ne la démontez pas, ne l'exposez ni au feu ni à l'eau. Ne la mettez pas en court-circuit. Pour la mettre au rebut, conformez-vous à la réglementation en vigueur. Lorsque vous remplacez la batterie, veillez à n'utiliser que les modèles cités dans la liste de pièces détachées adéquate. En effet, une batterie inappropriée risque de prendre feu ou d'exploser.

Akkus enthalten geringe Mengen von Nickel. Sie dürfen nicht zerlegt, wiederaufgeladen, kurzgeschlossen, oder Feuer oder Wasser ausgesetzt werden. Bei der Entsorgung die örtlichen Bestimmungen für Sondermüll beachten. Beim Ersetzen der Batterie nur Batterien des Typs verwenden, der in der Ersatzteilliste aufgeführt ist. Der Einsatz falscher Batterien kann zu Entzündung oder Explosion führen.

מארז הסוללה מכיל כמות קטנה של ניקל
וקדמיום. אין לפרק את מארז הסוללה, להשליך
אותו לאש או למים או לקצר אותו. יש לסלק את
מארז הסוללה הסוללה כנדרש על ידי התקנות
והחוקים המקומיים. יש להשתמש רק בסוללה
המופיעה ברשימת החלקים המתאימה בזמן החלפת
מארז הסוללה. שימוש בסוללה לא מתאימה עלול
לגרום להצתה או התפוצצות של הסוללה.

La batteria contiene piccole quantità di nichel. Non smontarla, gettarla nel fuoco o nell'acqua né cortocircuitarla. Smaltirla secondo la normativa in vigore (DPR 915/82, successive disposizioni e disposizioni locali). Quando si sostituisce la batteria, utilizzare soltanto i tipi inseriti nell'appropriato Catalogo parti. L'impiego di una batteria non adatta potrebbe determinare l'incendio o l'esplosione della batteria stessa.

(continued)

(continuation of safety notice 3)

Las baterías contienen pequeñas cantidades de níquel. No las desmonte, ni recargue, ni las eche al fuego o al agua ni las cortocircuite. Deséchelas tal como dispone la normativa local. Utilice sólo baterías que se encuentren en la lista de piezas al sustituir la batería. La utilización de una batería no apropiada puede provocar la ignición o explosión de la misma.

Safety notice 4**DANGER**

The lithium battery can cause a fire, an explosion, or a severe burn. Do not recharge it, remove its polarized connector, disassemble it, heat it above 100°C (212°F), incinerate it, or expose its cell contents to water. Dispose of the battery as required by local ordinances or regulations. Use only the battery in the appropriate parts listing. Use of an incorrect battery can result in ignition or explosion of the battery.

La pile de sauvegarde contient du lithium. Elle présente des risques d'incendie, d'explosion ou de brûlures graves. Ne la rechargez pas, ne retirez pas son connecteur polarisé et ne la démontez pas. Ne l'exposez pas à une température supérieure à 100°C, ne la faites pas brûler et n'en exposez pas le contenu à l'eau. Mettez la pile au rebut conformément à la réglementation en vigueur. Une pile inappropriée risque de prendre feu ou d'exploser.

Die Systematterie ist eine Lithiumatterie. Sie kann sich entzünden, explodieren oder schwere Verbrennungen hervorrufen. Batterien dieses Typs dürfen nicht aufgeladen, zerlegt, über 100 C erhitzt oder verbrannt werden. Auch darf ihr Inhalt nicht mit Wasser in Verbindung gebracht oder der zur richtigen Polung angebrachte Verbindungsstecker entfernt werden. Bei der Entsorgung die örtlichen Bestimmungen für Sondermüll beachten. Beim Ersetzen der Batterie nur Batterien des Typs verwenden, der in der Ersatzteilliste aufgeführt ist. Der Einsatz falscher Batterien kann zu Entzündung oder Explosion führen.

(continued)

(continuation of safety notice 4)

סוללת הליתיום עלולה לגרום לשריפה, להתפוצצות או לכוויות קשות. אין לטעון אותה מחדש, לסלק את המחבר המקוטב שלה, לפרק אותה או לחמם אותה לטמפרטורה העולה על 100 מעלות צלזיוס. אין לשרוף את הסוללה ואין לחשוף את תוכן התא למים. יש לסלק את הסוללה כנדרש בתקנות ובחוקים המקומיים. יש להשתמש רק בסוללה המופיעה ברשימת החלקים המתאימים. שימוש בסוללה אחרת עלול לגרום לסכנת שריפה או התפוצצות.

La batteria di supporto e una batteria al litio e puo incendiarsi, esplodere o procurare gravi ustioni. Evitare di ricaricarla, smontarne il connettore polarizzato, smontarla, riscaldarla ad una temperatura superiore ai 100 gradi centigradi, incendiarla o gettarla in acqua. Smaltirla secondo la normativa in vigore (DPR 915/82, successive disposizioni e disposizioni locali). L'impiego di una batteria non adatta potrebbe determinare l'incendio o l'esplosione della batteria stessa.

La batería de repuesto es una batería de litio y puede provocar incendios, explosiones o quemaduras graves. No la recargue, ni quite el conector polarizado, ni la desmonte, ni caliente por encima de los 100°C (212°F), ni la incinere ni exponga el contenido de sus celdas al agua. Deséchela tal como dispone la normativa local.

Safety notice 5

If the LCD breaks and the fluid from inside the LCD gets into your eyes or on your hands, immediately wash the affected areas with water for at least 15 minutes. Seek medical care if any symptoms from the fluid are present after washing.

Si le panneau d'affichage à cristaux liquides se brise et que vous recevez dans les yeux ou sur les mains une partie du fluide, rincez-les abondamment pendant au moins quinze minutes. Consultez un médecin si des symptômes persistent après le lavage.

Die Leuchtstoffröhre im LCD-Bildschirm enthält Quecksilber. Bei der Entsorgung die örtlichen Bestimmungen für Sondermüll beachten. Der LCD-Bildschirm besteht aus Glas und kann zerbrechen, wenn er unsachgemäß behandelt wird oder der Computer auf den Boden fällt. Wenn der Bildschirm beschädigt ist und die darin befindliche Flüssigkeit in Kontakt mit Haut und Augen gerät, sollten die betroffenen Stellen mindestens 15 Minuten mit Wasser abgespült und bei Beschwerden anschließend ein Arzt aufgesucht werden.

אם מסך הגביש הנוזלי (LCD) נשבר והנוזל מתוך המסך בא במגע עם עיניכם או ידיכם, שטפו את האזורים הנגועים מיד במים במשך 15 דקות לפחות. פנו לקבלת עזרה רפואית אם תסמינים הנובעים מהמגע עם הנוזל נמשכים לאחר השטיפה.

Nel caso che caso l'LCD si dovesse rompere ed il liquido in esso contenuto entrasse in contatto con gli occhi o le mani, lavare immediatamente le parti interessate con acqua corrente per almeno 15 minuti; poi consultare un medico se i sintomi dovessero permanere.

Si la LCD se rompe y el fluido de su interior entra en contacto con sus ojos o sus manos, lave inmediatamente las áreas afectadas con agua durante 15 minutos como mínimo. Obtenga atención medica si se presenta algún síntoma del fluido despues de lavarse.

Safety notice 6



DANGER

To avoid shock, do not remove the plastic cover that protects the inverter card.

Afin d'éviter tout risque de choc électrique, ne retirez pas le cache en plastique protégeant la partie inférieure de la carte d'alimentation.

Aus Sicherheitsgründen die Kunststoffabdeckung, die den unteren Teil der Spannungswandlerplatine umgibt, nicht entfernen.

כדי למנוע התחשמלות, אין להסיר את מכסה הפלסטיק
המגן על חלקו התחתון של הכרטיס ההפוך.

Per evitare scosse elettriche, non rimuovere la copertura in plastica che avvolge la parte inferiore della scheda invertitore.

Para evitar descargas, no quite la cubierta de plástico que rodea la parte baja de la tarjeta invertida.

Safety notice 7

**DANGER**

Though the main batteries have low voltage, a shorted or grounded battery can produce enough current to burn personnel or combustible materials.

Bien que le voltage des batteries principales soit peu élevé, le court-circuit ou la mise à la masse d'une batterie peut produire suffisamment de courant pour brûler des matériaux combustibles ou causer des brûlures corporelles graves.

Obwohl Hauptbatterien eine niedrige Spannung haben, können sie doch bei Kurzschluß oder Erdung genug Strom abgeben, um brennbare Materialien zu entzünden oder Verletzungen bei Personen hervorzurufen.

אף שהסוללות הראשיות הן בעלות מתח נמוך, סוללה מקוצרת או מוארקת עלולה להפיק זרם מספיק לגרימת כוויות או להצתת חומרים דליקים.

Sebbene le batterie di alimentazione siano a basso voltaggio, una batteria in corto circuito o a massa può fornire corrente sufficiente da bruciare materiali combustibili o provocare ustioni ai tecnici di manutenzione.

Aunque las baterías principales tienen un voltaje bajo, una batería cortocircuitada o con contacto a tierra puede producir la corriente suficiente como para quemar material combustible o provocar quemaduras en el personal.

Safety notice 8



DANGER

Before removing any FRU, power off the computer, unplug all power cords from electrical outlets, remove the battery pack, and then disconnect any interconnecting cables.

Avant de retirer une unité remplaçable en clientèle, mettez le système hors tension, débranchez tous les cordons d'alimentation des socles de prise de courant, retirez la batterie et déconnectez tous les cordons d'interface.

Die Stromzufuhr muß abgeschaltet, alle Stromkabel aus der Steckdose gezogen, der Akku entfernt und alle Verbindungskabel abgenommen sein, bevor eine FRU entfernt wird.

לפני סילוק FRU כלשהו, יש לכבות את המחשב, לנתק את כל כבלי החשמל משקעי החשמל, להוציא את מארז הסוללה, ואז לנתק כבלי חיבור אחרים אם יש כאלה.

Prima di rimuovere qualsiasi FRU, spegnere il sistema, scollegare dalle prese elettriche tutti i cavi di alimentazione, rimuovere la batteria e poi scollegare i cavi di interconnessione.

Antes de quitar una FRU, apague el sistema, desenchufe todos los cables de las tomas de corriente eléctrica, quite la batería y, a continuación, desconecte cualquier cable de conexión entre dispositivos.

Safety information

The following section presents the safety information that you need to be familiar with before servicing an IBM mobile computer.

General safety

Follow these rules to ensure general safety:

- Observe good housekeeping in the area of the machines during and after maintenance.
- When lifting any heavy object:
 1. Ensure you can stand safely without slipping.
 2. Distribute the weight of the object equally between your feet.
 3. Use a slow lifting force. Never move suddenly or twist when you attempt to lift.
 4. Lift by standing or by pushing up with your leg muscles; this action removes the strain from the muscles in your back. *Do not attempt to lift any object that weighs more than 16 kg (35 lb) or objects that you think are too heavy for you.*
- Do not perform any action that causes hazards to the customer, or that makes the equipment unsafe.
- Before you start the machine, ensure that other service representatives and the customer's personnel are not in a hazardous position.
- Place removed covers and other parts in a safe place, away from all personnel, while you are servicing the machine.
- Keep your toolcase away from walk areas so that other people will not trip over it.
- Do not wear loose clothing that can be trapped in the moving parts of a machine. Make sure that your sleeves are fastened or rolled up above your elbows. If your hair is long, fasten it.
- Insert the ends of your necktie or scarf inside clothing or fasten it with a nonconductive clip, approximately 8 centimeters (3 inches) from the end.
- Do not wear jewelry, chains, metal-frame eyeglasses, or metal fasteners for your clothing.

Attention: Metal objects are good electrical conductors.

- Wear safety glasses when you are hammering, drilling, soldering, cutting wire, attaching springs, using solvents, or working in any other conditions that might be hazardous to your eyes.

- After service, reinstall all safety shields, guards, labels, and ground wires. Replace any safety device that is worn or defective.
- Reinstall all covers correctly before returning the machine to the customer.
- Fan louvers on the machine help to prevent overheating of internal components. Do not obstruct fan louvers or cover them with labels or stickers.

Warning

Handling the cord on this product or cords associated with accessories sold with this product will expose you to lead, a chemical known to the state of California to cause cancer, and birth defects or other reproductive harm. ***Wash hands after handling.***

Electrical safety

Observe the following rules when working on electrical equipment.

Important

Use only approved tools and test equipment. Some hand tools have handles covered with a soft material that does not insulate you when working with live electrical currents.

Many customers have, near their equipment, rubber floor mats that contain small conductive fibers to decrease electrostatic discharges. Do not use this type of mat to protect yourself from electrical shock.

- Find the room emergency power-off (EPO) switch, disconnecting switch, or electrical outlet. If an electrical accident occurs, you can then operate the switch or unplug the power cord quickly.
- Do not work alone under hazardous conditions or near equipment that has hazardous voltages.
- Disconnect all power before:
 - Performing a mechanical inspection
 - Working near power supplies
 - Removing or installing main units
- Before you start to work on the machine, unplug the power cord. If you cannot unplug it, ask the customer to power-off the wall box that supplies power to the machine and to lock the wall box in the off position.
- If you need to work on a machine that has *exposed* electrical circuits, observe the following precautions:

- Ensure that another person, familiar with the power-off controls, is near you.

Attention: Another person must be there to switch off the power, if necessary.

- Use only one hand when working with powered-on electrical equipment; keep the other hand in your pocket or behind your back.

Attention: An electrical shock can occur only when there is a complete circuit. By observing the above rule, you may prevent a current from passing through your body.

- When using testers, set the controls correctly and use the approved probe leads and accessories for that tester.
- Stand on suitable rubber mats (obtained locally, if necessary) to insulate you from grounds such as metal floor strips and machine frames.

Observe the special safety precautions when you work with very high voltages; these instructions are in the safety sections of maintenance information. Use extreme care when measuring high voltages.

- Regularly inspect and maintain your electrical hand tools for safe operational condition.
- Do not use worn or broken tools and testers.
- *Never assume* that power has been disconnected from a circuit. First, *check* that it has been powered off.
- Always look carefully for possible hazards in your work area. Examples of these hazards are moist floors, nongrounded power extension cables, power surges, and missing safety grounds.
- Do not touch live electrical circuits with the reflective surface of a plastic dental mirror. The surface is conductive; such touching can cause personal injury and machine damage.
- Do not service the following parts *with the power on* when they are removed from their normal operating places in a machine:
 - Power supply units
 - Pumps
 - Blowers and fans
 - Motor generators

and similar units. (This practice ensures correct grounding of the units.)

- If an electrical accident occurs:
 - Use caution; do not become a victim yourself.
 - Switch off power.
 - Send another person to get medical aid.

Safety inspection guide

The purpose of this inspection guide is to assist you in identifying potentially unsafe conditions. As each machine was designed and built, required safety items were installed to protect users and service personnel from injury. This guide addresses only those items. You should use good judgment to identify potential safety hazards due to attachment of non-IBM features or options not covered by this inspection guide.

If any unsafe conditions are present, you must determine how serious the apparent hazard could be and whether you can continue without first correcting the problem.

Consider these conditions and the safety hazards they present:

- Electrical hazards, especially primary power (primary voltage on the frame can cause serious or fatal electrical shock)
- Explosive hazards, such as a damaged CRT face or a bulging capacitor
- Mechanical hazards, such as loose or missing hardware

To determine whether there are any potentially unsafe conditions, use the following checklist at the beginning of every service task. Begin the checks with the power off, and the power cord disconnected.

Checklist:

1. Check exterior covers for damage (loose, broken, or sharp edges).
2. Power-off the computer. Disconnect the power cord.
3. Check the power cord for:
 - a. A third-wire ground connector in good condition. Use a meter to measure third-wire ground continuity for 0.1 ohm or less between the external ground pin and frame ground.
 - b. The power cord should be the type specified in the parts list.
 - c. Insulation must not be frayed or worn.
4. Remove the cover.
5. Check for any obvious non-IBM alterations. Use good judgment as to the safety of any non-IBM alterations.
6. Check inside the unit for any obvious unsafe conditions, such as metal filings, contamination, water or other liquids, or signs of fire or smoke damage.
7. Check for worn, frayed, or pinched cables.

8. Check that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

Handling devices that are sensitive to electrostatic discharge

Any computer part containing transistors or integrated circuits (ICs) should be considered sensitive to electrostatic discharge (ESD.) ESD damage can occur when there is a difference in charge between objects. Protect against ESD damage by equalizing the charge so that the machine, the part, the work mat, and the person handling the part are all at the same charge.

Notes

1. Use product-specific ESD procedures when they exceed the requirements noted here.
2. Make sure that the ESD protective devices you use have been certified (ISO 9000) as fully effective.

When handling ESD-sensitive parts:

- Keep the parts in protective packages until they are inserted into the product.
- Avoid contact with other people.
- Wear a grounded wrist strap against your skin to eliminate static on your body.
- Prevent the part from touching your clothing. Most clothing is insulative and retains a charge even when you are wearing a wrist strap.
- Use the black side of a grounded work mat to provide a static-free work surface. The mat is especially useful when handling ESD-sensitive devices.
- Select a grounding system, such as those listed below, to provide protection that meets the specific service requirement.

Note

The use of a grounding system is desirable but not required to protect against ESD damage.

- Attach the ESD ground clip to any frame ground, ground braid, or green-wire ground.
- Use an ESD common ground or reference point when working on a double-insulated or battery-operated system. You can use coax or connector-outside shells on these systems.

- Use the round ground-prong of the AC plug on AC-operated computers.

Grounding requirements

Electrical grounding of the computer is required for operator safety and correct system function. Proper grounding of the electrical outlet can be verified by a certified electrician.

Laser compliance statement

Some IBM Personal Computer models are equipped from the factory with an optical storage device such as a CD-ROM drive or a DVD-ROM drive. They are also sold separately as options. The drive is certified in the U.S. to conform to the requirements of the Department of Health and Human Services 21 Code of Federal Regulations (DHHS 21 CFR) Subchapter J for Class 1 laser products. Elsewhere, the drive is certified to conform to the requirements of the International Electrotechnical Commission (IEC) 825 and CENELEC EN 60 825 for Class 1 laser products.

When a CD-ROM drive, DVD drive or the other laser product is installed, note the following:

 CAUTION:

Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.

O uso de controles, ajustes ou desempenho de procedimentos diferentes daqueles aqui especificados pode resultar em perigosa exposição à radiação.

凡未在这里指明的任何控制用法、调整、行为，都会导致严重后果。

Pour éviter tout risque d'exposition au rayon laser, respectez les consignes de réglage et d'utilisation des commandes, ainsi que les procédures décrites.

Werden Steuer- und Einstellelemente anders als hier festgesetzt verwendet, kann gefährliche Laserstrahlung auftreten.

Az itt előírt eljárásoktól, beállítástoktól és vezérlésektől eltérni a lézersugárzás veszélye miatt kockázatos !

L'utilizzo di controlli, regolazioni o l'esecuzione di procedure diverse da quelle specificate possono provocare l'esposizione a.

Использование элементов настройки и выполнение процедур иных, чем указано здесь, может привести к опасному радиационному облучению.

Použitie kontrôl, úprav alebo iných vykonaní od iných výrobcov, ako je v tomto špecifikované, mohlo by mať za následok nebezpečenstvo vystavenia sa vyžiarovaniu.

El uso de controles o ajustes o la ejecución de procedimientos distintos de los aquí especificados puede provocar la exposición a radiaciones peligrosas.

Opening the CD-ROM drive, DVD-ROM drive or the other optical storage device could result in exposure to hazardous laser radiation. There are no serviceable parts inside those drives. **Do not open.**

Some CD-ROM drives, DVD-ROM drives, or other optical storage devices contain an embedded Class 3A or Class 3B laser diode. Note the following:

⚠ DANGER

Emits visible and invisible laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.

Radiação por raio laser ao abrir. Não olhe fixo no feixe de luz, não olhe diretamente por meio de instrumentos óticos e evite exposição direta com o feixe de luz.

开启时会有激光发射时，请勿盯视激光光束，请勿直接查看视觉仪器，并且避免直接接触在激光光束之中。

Rayonnement laser si carter ouvert. Évitez de fixer le faisceau, de le regarder directement avec des instruments optiques, ou de vous exposer au rayon.

Laserstrahlung bei geöffnetem Gerät. Nicht direkt oder über optische Instrumente in den Laserstrahl sehen und den Strahlungsbereich meiden.

Kinyitáskor lézersugár ! Ne nézzen bele se szabad szemmel, se optikai eszközökkel. Kerülje a sugárnyalábbal való érintkezést !.

Aprenendo l'unità vengono emesse radiazioni laser. Non fissare il fascio, non guardarlo direttamente con strumenti ottici e evitare l'esposizione diretta al fascio.

Открывая, берегитесь лазерного излучения.

Не смотрите на луч, не разглядывайте его с помощью оптических инструментов, а также избегайте прямого воздействия лазерного луча.

Keď je laserová jednotka otvorená. Vyhnite sa priamemu pohľadu a nehládte priamo s optickými nástrojmi do lúča a vyhnite sa priamemu vystaveniu lúčov.

Radiación láser al abrir. No mire fijamente ni examine con instrumental óptico el haz de luz. Evite la exposición directa al haz.

Chapter 3. General descriptions

This chapter includes descriptions for any ThinkPad model that has the PC-Doctor DOS diagnostics program. Some descriptions might not apply to your particular computer.

Read this first

Before you go to the checkout guide, be sure to read this section.

Important notes

- **Only certified trained personnel should service the computer.**
- **Read the entire FRU removal and replacement page before replacing any FRU.**
- **Use new nylon-coated screws when you replace FRUs.**
- **Be extremely careful during write operations such as copying, saving, or formatting.** The drive startup sequence in the computer you are servicing might have been changed. If you select an incorrect drive, data or programs might be overwritten.
- **Replace FRUs only for the correct model.** When you replace a FRU, make sure the model of the machine and the FRU part number are correct by referring to the FRU parts list.
- **A FRU should not be replaced because of a single, unreproducible failure.** Single failures can occur for a variety of reasons that have nothing to do with a hardware defect, such as cosmic radiation, electrostatic discharge, or software errors. Consider replacing a FRU only when a problem recurs. If you suspect that a FRU is defective, clear the error log and run the test again. If the error does not recur, do not replace the FRU.
- **Be careful not to replace a nondefective FRU.**

What to do first

When you do return a FRU, you must include the following information in the parts exchange form or parts return form that you attach to it:

- ___ 1. Name and phone number of servicer
- ___ 2. Date of service
- ___ 3. Date on which the machine failed

Read this first

- ___ 4. Date of purchase
- ___ 5. Failure symptoms, error codes appearing on the display, and beep symptoms
- ___ 6. Procedure index and page number in which the failing FRU was detected
- ___ 7. Failing FRU name and part number
- ___ 8. Machine type, model number, and serial number
- ___ 9. Customer's name and address

Note for warranty:

During the warranty period, the customer may be responsible for repair costs if the computer damage was caused by misuse, accident, modification, unsuitable physical or operating environment, or improper maintenance by the customer. The following list provides some common items that are not covered under warranty and some symptoms that might indicate that the system was subjected to stress beyond normal use.

Before checking problems with the computer, determine whether the damage is covered under the warranty by referring to the following:

The following are not covered under warranty:

- LCD panel cracked from the application of excessive force or from being dropped
- Scratched (cosmetic) parts
- Distortion, deformation, or discoloration of the cosmetic parts
- Cracked or broken plastic parts, broken latches, broken pins, or broken connectors caused by excessive force
- Damage caused by liquid spilled into the system
- Damage caused by the improper insertion of a PC Card or the installation of an incompatible card
- Damage caused by foreign material in the diskette drive
- Diskette drive damage caused by pressure on the diskette drive cover or by the insertion of a diskette with multiple labels
- Damaged or bent diskette eject button
- Fuses blown by attachment of a nonsupported device
- Forgotten computer password (making the computer unusable)
- Sticky keys caused by spilling a liquid onto the keyboard

The following symptoms might indicate damage caused by nonwarranted activities:

- Missing parts might be a symptom of unauthorized service or modification.

- If the spindle of a hard disk drive becomes noisy, it may have been subjected to excessive force, or dropped.

Related service information

This section provides information about the following:

- “Service Web site”
- “Restoring the preloaded system”
- “Passwords” on page 30
- “Power management” on page 33

Service Web site

When the latest maintenance diskette and the system program service diskette become available, a notice will be posted on <http://www.ibm.com/pc/partner/infotips>

Restoring the preloaded system

If the data on a hard disk drive is damaged or accidentally erased, you can restore the software that was shipped with the computer. This software includes the pre-installed operating system, applications, and device drivers.

To restore the pre-installed software, you can use either the Product Recovery program or a recovery CD.

Ordering the recovery CD

When the hard disk drive is replaced because of a failure, no Product Recovery program is on the new hard disk. In this case, you must use the Product Recovery CD for the computer. Order the recovery CD and the hard disk drive at the same time so that you can recover the new hard disk drive with the pre-installed software when they arrive. For information on which CD to order, and the latest procedure on how to do so, see “Recovery CDs” on page 121.

The Product Recovery program is in the Access IBM Predesktop Area, a section of the hard disk drive that is not displayed by Windows Explorer.

Note: The recovery process might take up to 2 hours.

Attention: All of the files on the primary hard disk partition (usually drive C) will be lost in the recovery process. Be sure to back up copies of the files you have saved on your drive C before you begin.

To use the Product Recovery program to install your pre-installed software, do the following:

1. If possible, save all your files to media other than your hard disk.
2. Turn off your computer.

3. Turn on your computer. At the prompt, press the Access IBM button. (The prompt “To interrupt normal startup, press the blue Access IBM button” appears for only a few seconds. You must press the Access IBM button quickly.) The Access IBM Predesktop Area appears on the screen. Next, double-click the “Recover to factory contents” icon. The Product Recovery program main menu opens.
4. Select the recovery options you want, and then follow the instructions on the screen.
5. When the Product Recovery program finishes, your computer will restart and begin the configuration process.

Using the recovery CD

You can delete the Access IBM Predesktop Area partition by going into the BIOS Setup Utility (F1 at IBM Splash Screen), and then choosing Security -> IBM Predesktop Area --> Disabled. This will make the Access IBM Predesktop Area available to FDISK. If you choose Disabled, the following warning appears:

Attention! If you select Disabled, the IBM Predesktop Area will be visible and can be reclaimed by the OS. Once the area is overwritten by OS tools, it can't be used with Normal or Secure again and you will need to obtain a Recovery CD to retrieve original HDD. Please confirm that you wish to select Disabled.

FDISK will not delete the Access IBM Predesktop Area unless you do this, because it is not visible. You would have to use IBM ThinkPad Maintenance Diskette to completely wipe the drive.

To create the Access IBM Predesktop Area and install the preloaded system from the recovery CD, do the following:

To create the Access IBM Predesktop Area:

1. Erase all partitions on the hard disk drive, using FDISK or a similar application.
2. Boot with the recovery CD (and the boot diskette if required).
3. The following message is displayed: **“Your computer originally included a Product Recovery program ... Reinstall the Product Recovery program? (Y/N) []”**.

Note: If the hard disk drive contains any partition, you do not receive this message; go to step 1.

4. Press the Y key. The Access IBM Predesktop Area is created and loaded with the Product Recovery program files.

Note: If you do not want to create the Access IBM Predesktop Area, press the N key, and then go to step 8.

5. At the next window, press Enter to continue.
 - The Access IBM Predesktop Area is created. The system automatically reboots during this process.
 - The recovery process copies some files to the Access IBM Predesktop Area, and PKUNZIPs others.
 - Follow the prompts. You may be prompted to change CDs.
 - When the process is complete, the system reboots. Continue to step 6 to install preloaded system.

Install the preloaded system from the CD:

6. Boot with the recovery CD (and the boot diskette if required.)
7. If the hard disk drive is blank, the following message is displayed: **“Your computer originally included a Product Recovery program ... Reinstall the Product Recovery program? (Y/N) []”**.
 - To install the Access IBM Predesktop Area, go to step 4.
 - To preload the hard disk drive without installing the Access IBM Predesktop Area, press the N key.
8. If you get a message asking which operating system to install, select the proper operating system and press Enter.
9. A message is displayed: **“Full Recovery:”**. Press Enter to select.
10. On each of the next three windows, press the Y key.
11. Follow the prompts to complete the recovery.

Passwords

As many as three passwords may be needed for any ThinkPad computer: the power-on password (POP), the hard disk password (HDP), and the supervisor password (SVP).

If any of these passwords has been set, a prompt for it appears on the screen whenever the computer is turned on. The computer does not start until the password is entered.

Exception: If only an SVP is installed, the password prompt does not appear when the operating system is booted.

Power-on password:

A power-on password (POP) protects the system from being powered on by an unauthorized person. The password must be entered before an operating system can be booted.

Hard disk password:

There are two hard disk passwords (HDPs):

- User HDP—for the user
- Master HDP—for the system administrator, who can use it to get access to the hard disk even if the user has changed the user HDP

Note: There are two modes for the HDP: **User only** and **Master + User**. The **Master + User** mode requires two HDPs; the system administrator enters both in the same operation. The system administrator then provides the user HDP to the system user.

Attention: If the user HDP has been forgotten, check whether a master HDP has been set. If it has, it can be used for access to the hard disk drive. If no master HDP is available, IBM does not provide any services to reset either the user or the master HDP, or to recover data from the hard disk drive. The hard disk drive can be replaced for a scheduled fee.

Supervisor password:

A supervisor password (SVP) protects the system information stored in the IBM BIOS Setup Utility. The SVP must be entered in order to get access to the IBM BIOS Setup Utility and make changes to system configuration settings.

Attention: If the SVP has been forgotten and cannot be made available to the servicer, there is no service procedure to reset the password. The system board must be replaced for a scheduled fee.

How to remove the power-on password

To remove a POP that has been forgotten, do the following:

(A) If no SVP has been set:

1. Turn off the computer.
2. Remove the battery pack.

For how to remove the battery pack, see “1010 Battery pack” on page 62.

3. Remove the backup battery.

For how to remove the backup battery, see “1060 Backup battery” on page 68.

4. Turn on the computer and wait until the IBM Splash Screen disappears.
After the POST ends, the password prompt does not appear. The POP has been removed.
5. Reinstall the backup battery and the battery pack.

(B) If an SVP has been set and is known by the servicer:

1. Turn on the computer; then, while the “To interrupt normal startup, press F1” message is displayed at the lower-left of the screen, press F1.
2. Enter the SVP. Select **Start setup utility**.
3. Select **Security**, using the cursor keys to move down the menu.
4. Select **Password**.
5. Select **Power-On Password**.
6. At the Enter Current Password field, enter the SVP.
7. When the Enter New Password field opens, leave it blank and press Enter twice.
8. In the Changes have been saved window, press Enter.
9. Press F10; then, in the Setup confirmation window, select **Yes**.

How to remove the hard disk password

Attention: If **User only** mode is selected and the user HDP has been forgotten and cannot be made available to the servicer, IBM does not provide any services to reset the user HDPs or to recover data from the hard disk drive. The hard disk drive can be replaced for a scheduled fee.

To remove a user HDP that has been forgotten, when the SVP and the master HDP are known, do the following:

1. Turn on the computer; then, while the “To interrupt normal startup, press the blue Access IBM button” message is displayed at the lower-left of the screen, press the Access IBM button.
2. Enter Master HDP. Select **Start setup utility**. Enter SVP.
3. Select **Security**, using the cursor keys to move down the menu.
4. Select **Password**.
5. Select **Hard-disk x password**, where x is the letter of the hard disk drive. A pop-up window opens.
6. Select **Master HDP**.
7. Enter the master HDP; then leave the New Password field blank and press Enter twice.
8. Press F10.
9. Select **Yes** in the Setup Configuration window.

Both user HDP and master HDP will have been removed.

Power management

To reduce power consumption, the computer has three power management modes: screen blank, standby, and hibernation.

Screen blank mode

Screen blank mode has three variants, as follows:

1. If you are using the ACPI operating system and you press Fn+F3,
 - The LCD backlight turns off.
 - The hard disk drive motor stops.
2. If the time set on the “Turn off monitor” timer in the operating system expires,
 - The LCD backlight turns off.

To end screen blank mode and resume normal operation, press any key.

Standby mode

When the computer enters standby mode, the following events occur in addition to what occurs in screen blank mode:

- The LCD is powered off.
- The hard disk drive is powered off.
- The CPU stops.

To enter standby mode, press Fn+F4.

Note: You can change the action of Fn+F4, if you are using the ACPI operating system.

In certain circumstances, the computer goes into standby mode automatically:

- If a “suspend time” has been set on the timer, and the user does not do any operation with the keyboard, the TrackPoint, the hard disk, the parallel connector, or the diskette drive within that time.
- If the battery indicator blinks orange, indicating that the battery power is low. (Alternatively, if **Hibernate when battery becomes low** has been selected in the “Power Management Properties” window, the computer goes into hibernation mode.)

Hibernation mode

In hibernation mode, the following occurs:

- The system status, RAM, VRAM, and setup data are stored on the hard disk.
- The system is powered off.

To cause the computer to enter hibernation mode, do any of the following:

- Press the Fn+F12 keys.
- If you are using the ACPI operating system and have defined one of the following actions as the event that causes the system to go into hibernation mode, perform that action.
 - Closing the lid.
 - Pressing the power button.
 - Pressing Fn+F4 keys.

Also, the computer goes into hibernation mode automatically in either of the following conditions:

- If a “hibernation time” has been set on the timer, and the user does not do any operation with the keyboard, the TrackPoint, the hard disk drive, the parallel connector, or the diskette drive within that time.
- If the timer conditions are satisfied in suspend mode.

When the power is turned on, the computer returns from hibernation mode and resumes operation. The hibernation file in the boot record on the hard disk drive is read, and system status is restored from the hard disk drive.

Checkout guide

Use the following procedures as a guide in identifying and correcting problems with the ThinkPad computer.

Note: The diagnostic tests are intended to test only IBM products. The use of non-IBM products, prototype cards, or modified options can lead to false indications of errors and invalid system responses.

1. Identify the failing symptoms in as much detail as possible.
2. Verify the symptoms. Try to re-create the failure by running the diagnostic test or by repeating the operation.

Testing the computer

The ThinkPad computer has a test program called PC-Doctor[®] DOS (hereafter called *PC-Doctor*.) You can detect errors by running the diagnostics test included in PC-Doctor. This section is an overview of the procedure. For details that depend on model-unique functions, refer to “Product overview” on page 43.

For some possible configurations of the computer, PC-Doctor might not run correctly. To avoid this problem, you need to initialize the computer setup by use of the IBM BIOS Setup Utility before you run PC-Doctor. On the IBM BIOS Setup Utility screen, press F9, Enter, F10, and then Enter.

Note: When you initialize the computer configuration, some devices are disabled, such as the serial port. If you test one of these devices, you will need to enable it by using PS2.EXE.

To run the test, do as follows:

Note: In the following procedure, you can select an item not only with the arrow keys, but also with the TrackPoint. Instead of pressing Enter, click the left button.

1. Insert the PC-Doctor disk into the diskette drive; then power on the computer.

If the computer cannot be powered on, go to “Power system checkout” on page 37, and check the power sources.

If an error code appears, go to “Symptom-to-FRU index” on page 50.

On the first screen, select the model and press Enter. Follow the instructions on the screen.

2. The main panel of PC-Doctor appears.

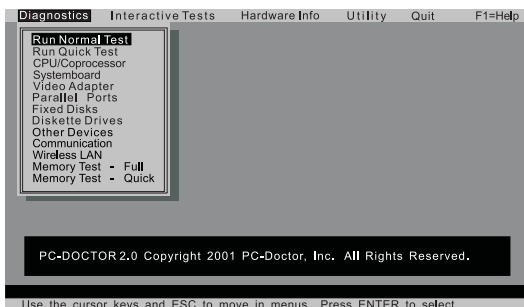
3. Select **Diagnostics** with the arrow keys, and press Enter.

A pull-down menu appears. (Its exact form depends on the model.)

Note: PC-Doctor menu does not mean the formal support device list. Some unsupported device name may appear in the PC-Doctor menu.

The options on the test menu are as follows:

Diagnostics	Interactive Tests
• Run Normal Test • Run Quick Test • CPU/Coprocessor • Systemboard • Video Adapter • Parallel Ports • Fixed Disks • Diskette Drives • Other Devices • Communication • Wireless LAN • Memory Test – Full • Memory Test – Quick	• Keyboard • Video • Internal Speaker • Mouse • Diskette • System Load • CD-ROM/DVD Test • Actiontec Wireless Radio
Notes: • In the Keyboard test in Interactive Tests, the Fn key should be held down for at least 2 seconds; otherwise, it cannot be sensed. • Video Adapter test supports only the LCD display on the ThinkPad computer. Before running PC-Doctor DOS, detach the external monitor.	



4. Run the applicable function test.
5. Follow the instructions on the screen. If there is a problem, PC-Doctor shows messages describing it.

6. To exit the test, select **Quit — Exit Diag.**

To cancel the test, press Esc.

Note: After executing PC-Doctor, check the system time/date and reset them if needed.

Detecting system information with PC-Doctor

PC-Doctor can detect the following system information:

Hardware Info

- System Configuration
- Memory Contents
- Physical Disk Drives
- Logical Disk Drives
- VGA Information
- IDE Drive Info
- PCI Information
- PNPISA Info
- SMBIOS Info
- VESA LCD Info

Utility

- Run External Tests
- Surface Scan Hard Disk
- Benchmark System
- DOS Shell
- Tech Support Form
- Battery Rundown
- View Test Log
- Print Log
- Save Log
- Full Erase Hard Drive
- Quick Erase Hard Drive

Power system checkout

To verify a symptom, do the following:

1. Power off the computer.
2. Remove the battery pack.
3. Connect the ac adapter.
4. Check that power is supplied when you power on the computer.
5. Power off the computer.
6. Disconnect the ac adapter and install the charged battery pack.
7. Check that the battery pack supplies power when you power on the computer.

If you suspect a power problem, see the appropriate one of the following power supply checkouts:

- “Checking the ac adapter”
- “Checking operational charging”
- “Checking the battery pack” on page 39
- “Checking the backup battery” on page 40

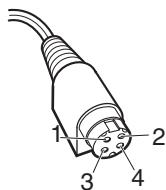
Checking the ac adapter

You are here because the computer fails only when the ac adapter is used:

- If the power-on indicator does not turn on, check the power cord of the ac adapter for correct continuity and installation.
- If the computer does not charge during operation, go to “Checking operational charging.”

To check the ac adapter, do the following:

1. Unplug the ac adapter cable from the computer.
2. Measure the output voltage at the plug of the ac adapter cable. See the following figure:



Pin	Voltage (V dc)
1	Vcc_+ 16V
2	Ground
3	Vcc_+ 16V
4	Ground

3. If the voltage is not correct, replace the ac adapter.
4. If the voltage is acceptable, do the following:
 - Replace the system board.
 - If the problem persists, go to “Product overview” on page 43.

Note: Noise from the ac adapter does not always indicate a defect.

Checking operational charging

To check whether the battery charges properly during operation, use a discharged battery pack or a battery pack that has less than 50% of the total power remaining when installed in the computer.

Perform operational charging. If the battery status indicator or icon does not turn on, remove the battery pack and let it return to room temperature. Reinstall the battery pack. If the charge indicator or icon still does not turn on, replace the battery pack.

If the charge indicator still does not turn on, replace the system board. Then reinstall the battery pack. If it is still not charged, go to the next section.

Checking the battery pack

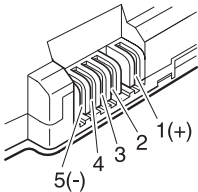
Battery charging does not start until the Power Meter shows that less than 95% of the total power remains; under this condition the battery pack can charge to 100% of its capacity. This protects the battery pack from being overcharged or from having a shortened life.

To check the status of your battery, move your cursor to the Power Meter icon in the icon tray of the Windows taskbar and wait for a moment (but do not click), and the percentage of battery power remaining is displayed. To get detailed information about the battery, double-click the Power Meter icon.

Note: If the battery pack becomes hot, it may not be able to charge. Remove it from the computer and leave it at room temperature for a while. After it cools down, reinstall and recharge it.

To check the battery pack, do the following:

1. Power off the computer.
2. Remove the battery pack and measure the voltage between battery terminals 1 (+) and 5 (–). See the following figure:



Terminal	Voltage (V dc)
1	+ 0 to + 12.6 (Li-ion)
	+ 0 to + 9.6 (NiMH)
5	Ground (–)

3. If the voltage is less than +11.0 V dc, the battery pack has been discharged.

Note: Recharging will take at least 3 hours, even if the indicator does not turn on.

If the voltage is still less than +11.0 V dc after recharging, replace the battery.

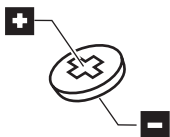
4. If the voltage is more than +11.0 V dc, measure the resistance between battery terminals 4 and 5. The resistance must be 4 to 30 K Ω .

If the resistance is not correct, replace the battery pack. If the resistance is correct, replace the system board.

Checking the backup battery

Do the following:

1. Power off the computer, and unplug the ac adapter from it.
2. Turn the computer upside down.
3. Remove the battery pack (see “1010 Battery pack” on page 62).
4. Remove the backup battery (see “Checking the battery pack” on page 39).
5. Measure the voltage of the backup battery. See the following figure.



Terminal	Voltage (V dc)
+	+2.5 to +3.2
-	Ground

- If the voltage is correct, replace the system board.
- If the voltage is not correct, replace the backup battery.
- If the backup battery discharges quickly after replacement, replace the system board.

Chapter 4. ThinkPad G40

Product overview	43
Specifications	43
Status indicators	45
FRU tests	47
Fn key combinations	49
Symptom-to-FRU index	50
Numeric error codes	50
Error messages	54
Beep symptoms	55
No-beep symptoms	55
LCD-related symptoms	56
Intermittent problems	57
Undetermined problems	57
FRU replacement notices	58
Screw notices	58
Retaining serial numbers.	59
Restoring the serial number of the system unit	59
Retaining the UUID	59
Removing and replacing a FRU.	61
1010 Battery pack.	62
1020 Hard disk drive	63
1030 DIMM door	65
1040 DIMM	66
1050 Modem daughter card (MDC)	67
1060 Backup battery	68
1070 Keyboard	69
1080 Middle cover	71
1090 Hinge cover	72
1095 FDD assembly	73
1100 CD-ROM/DVD drive	74
1110 Mini PCI adapter	75
1115 PC card slot assembly.	76
1120 LCD and Keyboard bezel assembly	79
1125 LCD assembly	81
1130 Keyboard bezel.	83
1140 Fan assembly	85
1145 Fan (CPU 3 GHz) and CPU fixture	87
1150 CPU	89
1160 CD-ROM/DVD drive bracket	90
1170 FDD bracket.	91
1180 System board	92
1190 Lower case assembly	93
1195 Modem cable	94
2000 PC card slot assembly.	95
2010 LCD front bezel.	96
2020 Inverter card	97
2030 Speaker assembly	98
2040 LCD cable assembly	99
2045 Wireless antenna and rear cover	101
2050 LCD panel and hinge assembly	102

Locations	103
Front view	103
Rear view.	104
Bottom view	105
Parts list	106
G40 series	106
Overall.	113
LCD FRUs	118
14.1 in. TFT	119
15 in. TFT.	119
Keyboard	120
Recovery CDs	121
For Windows XP Home Edition	121
For Windows XP professional	123
For Windows 2000	123
Miscellaneous parts	124
AC adapters	124
Telephone cable	125
Optional FRUs	126
Common parts list	127
Tools	127
Power cords	127
Notices	129
Trademarks	129

Product overview

This section presents the following product-unique information:

- “Specifications”
- “Status indicators” on page 45
- “FRU tests” on page 47
- “Fn key combinations” on page 49

Specifications

The following table lists the specifications of the ThinkPad G40 series:

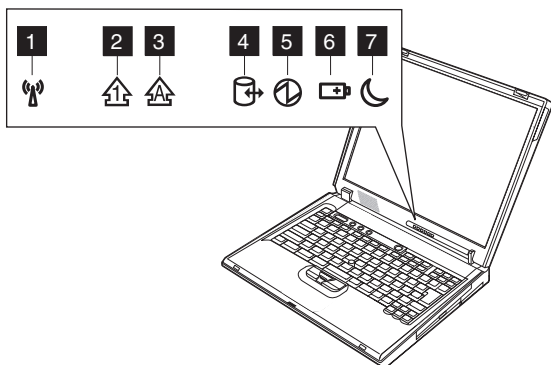
Feature	Description
Processor	• Intel® Pentium® 4 processor 2.4/ 2.6/2.8/3.0 GHz, L2 512 KB cache • Intel® Celeron® processor 2.0/2.2/2.4 GHz, L2 128 KB cache
Bus architecture	• 400 MHz FSB • HUB link • PCI bus • LPC bus • 266MHz DDR SDRAM (PC2100)
Memory (standard)	• 128 MB DDR SDRAM SO DIMM (PC2100) card × 1 • 256 MB DDR SDRAM SO DIMM (PC2100) card × 1 • 512 MB DDR SDRAM SO DIMM (PC2100) card × 1
Memory (optional)	• 128 MB DDR SDRAM SO DIMM (PC2100) card • 256 MB DDR SDRAM SO DIMM (PC2100) card • 512 MB DDR SDRAM SO DIMM (PC2100) (maximum of 1024 MB)
Graphic memory	• UMA architecture
CMOS RAM	• 242 bytes
hard disk drive	• 20.0 GB, 4200 rpm, 2.5-inch, IDE interface • 30.0 GB, 4200 rpm, 2.5-inch, IDE interface • 40.0 GB, 4200 rpm, 2.5-inch, IDE interface • 60.0 GB, 4200 rpm, 2.5-inch, IDE interface

(continued)

Feature	Description
Display	• 14.1-inch, 16M colors, XGA (1024 × 768 resolution) TFT color LCD • 15-inch, 16M colors, XGA (1024 × 768 resolution) TFT color LCD • 15-inch, 16M colors, SXGA+ (1400 × 1050 resolution) TFT color LCD
I/O port	• External monitor connector • Stereo headphone jack • Monaural microphone jack • Parallel connector • RJ11 connector • RJ45 connector • PS/2 mouse connector • Universal serial bus (USB) connector × 4
Audio	• Internal monaural speaker • Software control volume
Mini PCI adapter	• IEEE 802.11b wireless LAN card • IEEE 802.11a/b wireless LAN Combo card
PC Card	• One Type-III
Modem card	• V.90 (V.92 design) modem daughter card (MDC)
AC adapter	• 120-watt type
Fixed bays	• CD-ROM drive • DVD drive • CD-RW/DVD drive • FDD drive
Preinstalled operating system	Windows XP Home Edition Windows XP Professional Windows 2000Professional (Japan only)

Status indicators

The system status indicators show the status of the computer, as follows:



Indicator	Meaning
1 Wireless status	Green: Wireless is operational. This indicator is on when the Wireless is on and not in suspend mode.

Note: The wireless indicator is only available on selected models.

(continued)

Indicator	Meaning
2 Num lock	Green: The numeric keypad on the keyboard is enabled. To enable or disable the keypad, press and hold the Shift key, and press the NumLk (ScrLk) key.
3 Caps lock	Green: Caps Lock mode is enabled. To enable or disable Caps Lock mode, press the Caps Lock key.
4 Drive in use	Green: Data is being read from or written to the hard disk drive or the diskette drive. When this indicator is on, do not put the computer into standby mode or turn off the computer. Note: Do not move the system while the green drive-in-use light is on. Sudden physical shock could cause drive errors.
5 Power on	Green: The computer is on and ready to use. This indicator stays lit whenever the computer is on and is not in standby mode.
6 Battery status	Green: The battery is in use and has enough power. The ac adapter has charged the battery completely. Blinking green: The battery is being charged, but still has enough power to operate. (At regular intervals, the indicator light turns off briefly.) Orange: The battery is being charged, but the battery power is still low. Blinking orange: The battery needs to be charged. When the indicator starts blinking orange, the computer beeps three times.
7 Standby status	Green: The computer is in standby mode. Blinking green: The computer is entering standby mode or hibernation mode, or is resuming normal operation.

FRU tests

The following table shows the test for each FRU.

FRU	Applicable test
System board	1. Diagnostics --> CPU/Coprocessor 2. Diagnostics --> Systemboard
Power	Diagnostics --> Other Devices --> IBM AC Adapter, IBM Battery 1
LCD unit	1. Diagnostics --> Video Adapter 2. Interactive Tests --> Video
Modem, MDC	1. Make sure the modem is set up correctly. 2. Replace the modem jack and the modem card in turn, and run the following tests in Diagnostics --> Communication: a. Lucent Soft Modem Loopback b. Lucent Soft Modem Dialtone
Audio	1. Interactive Tests --> Internal Speaker 2. Diagnostics --> Other Devices --> Analog Devices AC97 CODEC Test
Speaker	Interactive Tests --> Internal Speaker
PC Card slots	1. Diagnostics --> Systemboard --> PCMCIA 2. Insert a PC Card Wrap Plug into every PC Card Slot and run Diagnostics --> Systemboard --> PCMCIA External Loop
Keyboard	1. Diagnostics --> Systemboard --> Keyboard 2. Interactive Tests --> Keyboard
TrackPoint or pointing device	If the TrackPoint does not work, check the configuration in the ThinkPad Configuration program. If the TrackPoint is disabled, select Enable to enable it. After you use the TrackPoint, the pointer may drift on the screen for a short time. This drift can occur when a slight, steady pressure is applied to the TrackPoint pointer. This symptom is not a hardware problem. If the pointer stops after a short time, no service action is necessary. If enabling the TrackPoint does not correct the problem, continue with the following: • Interactive Tests --> Mouse
Hard disk drive	Diagnostics --> Fixed Disks
Diskette drive	1. Diagnostics --> Diskette Drives 2. Interactive Tests --> Diskette

(continued)

FRU	Applicable test
CD-ROM or DVD drive	1. Diagnostics --> Other Devices --> CD-ROM/DVD 2. Interactive Tests --> CD-ROM/DVD Test
Memory	1. If two DIMMs are installed, remove one of them and run Diagnostics --> Memory Test—Quick. 2. If the problem does not recur, return the DIMM to its place, remove the other one, and run the test again. 3. If the test does not detect the error, run Diagnostics --> Memory Test—Full.
Fan	1. Turn on the computer and check the air turbulence at the louver near the power switch. 2. Run Diagnostics --> Other Devices --> IBM Fan.

Fn key combinations

The following table shows the function of each combination of Fn with a function key.

Key combination	Description
Fn+F1	Reserved.
Fn+F2	Reserved.
Fn+F3	Turn off the LCD display, leaving the screen blank. To turn the LCD display on again, press any key or the TrackPoint stick.
Fn+F4	Put the computer in standby mode. To return to normal operation, press the Fn key independently, without pressing a function key. Note: The setting can be changed so that pressing it puts the computer into hibernation mode or even shuts the computer down.
Fn+F5	Open the Wireless Radio Control screen. Note: This function is supported only in Windows XP and Windows 2000. To use this function, the IBM PM device driver must be installed on the computer. Windows 98 supports 802.11 Wireless Radio power control only.
Fn+F6	Reserved.
Fn+F7	Switch between the computer display and an external monitor (CRT). If an external monitor is attached, computer output is displayed in the following three patterns in turn: • CRT display • Computer display + CRT display • Computer display Note: In Windows XP and Windows 2000, this setting can be changed so that pressing it starts a presentation scheme directly with no need to start Presentation Director.
Fn+F9	Open the EasyEject Utility screen. Note: This function is supported only in Windows XP and Windows 2000.
Fn+F10	Reserved.
Fn+F11	Reserved.
Fn+F12	Put the computer into hibernation mode. To return to normal operation, press the power button for less than four seconds. Note: To use Fn+F12 for hibernation, the IBM PM device driver must be installed on the computer.
Fn+Home	The computer display becomes brighter.
Fn+End	The computer display becomes less bright.
Fn+Spacebar	Enable the FullScreen Magnifier function.

Symptom-to-FRU index

The symptom-to-FRU index in this section lists symptoms and errors and their possible causes. The most likely cause is listed first, in boldface type.

Note: Do the FRU replacement or other actions in the sequence shown in the column headed “FRU or action, in sequence.” If replacing a FRU does not solve the problem, put the original part back in the computer. Do not replace a nondefective FRU.

This index can also help you determine, during regular servicing, what FRUs are likely to need to be replaced next.

A numeric error is displayed for each error detected in POST or system operation. In the displays, **n** can be any number.

If no numeric code is displayed, check the narrative descriptions of symptoms. If the symptom is not described there, go to “Intermittent problems” on page 57.

Note

For an IBM device not supported by diagnostic codes in the ThinkPad notebook computers, see the manual for that device.

Numeric error codes

Symptom or error	FRU or action, in sequence
0175 Bad CRC1, stop POST task—The EEPROM checksum is not correct.	System board.
0177 Bad SVP data, stop POST task.	System board.
0182 Bad CRC2. Enter BIOS Setup and load Setup Defaults.	Run IBM BIOS Setup Utility and Load Setup Defaults.
0185 Bad startup sequence settings. Enter BIOS Setup and load setup defaults.	Run IBM BIOS Setup Utility and Load Setup Defaults

Symptom or error	FRU or action, in sequence
0187 EAIA data access error—The access to EEPROM is failed.	System board.
0188 Invalid RFID serialization information area or bad CRC2—The EEPROM checksum is not correct.	System board.
0189 Invalid RFID configuration information area—The EEPROM checksum is not correct.	System board.
0190 Critical low-battery error	Charge the battery pack. - Battery pack.
0191 System Security — Invalid remote change requested.	The system configuration change has failed. Confirm the operation and try again. To clear the error, enter the IBM BIOS Setup Utility.
0199 System security — IBM security password retry count exceeded.	Confirm supervisor password and try again. Run IBM BIOS Setup Utility.
0200 Hard disk error—The hard disk is not working.	Reseat the hard disk drive. - Load Setup Defaults in IBM BIOS Setup Utility. - Hard disk drive. - System board.
021x Keyboard error	Run interactive tests of the keyboard and the auxiliary input device.
0230 Shadow RAM error—Shadow RAM fails at offset nnnn.	System board.
0231 System RAM error—System RAM fails at offset nnnn.	DIMM. - System board.
0232 Extended RAM error—Extended RAM fails at offset nnnn.	DIMM. - System board.

Symptom or error	FRU or action, in sequence
0250 System battery error—System battery is dead.	Replace the backup battery and run IBM BIOS Setup Utility to reset the time and date.
0251 System CMOS checksum bad—Default configuration used.	Replace the backup battery and run IBM BIOS Setup Utility to reset the time and date.
0260 System timer error	Replace the backup battery and run IBM BIOS Setup Utility to reset the time and date. - System board.
0270 Real time clock error	Replace the backup battery and run IBM BIOS Setup Utility to reset the time and date. - System board.
0271 Date and time error—Neither the date nor the time is set in the computer.	Run IBM BIOS Setup Utility to reset the time and date.
0280 Previous boot incomplete—Default configuration used.	Load “Setup Default” in IBM BIOS Setup Utility. - DIMM. - System board.
02D0 System cache error	1. CPU
02F4 EISA CMOS not writable	Load Setup Defaults in IBM BIOS Setup Utility. - Replace the backup battery. - System board.
02F5 DMA test failed	DIMM. - System board.
02F6 Software NMI failed	DIMM. - System board.
02F7 Fail-safe timer NMI failed	DIMM. - System board.
1802 Unauthorized network card is plugged in—Power off and remove the miniPCI network card.	Remove Mini PCI network card. - System board.

Symptom or error	FRU or action, in sequence
1810 Hard disk partition layout error	1. If the Access IBM Predesktop Area has been previously disabled, then go to the IBM BIOS Setup Utility by pressing F1 to open the IBM BIOS Setup Utility. Select Security->IBM Predesktop Area->Access IBM Predesktop Area. Set this item to Disabled. Save and Exit. 2. If the Access IBM Predesktop Area has been previously disabled, press Enter to load Access IBM Predesktop Area. Then run RECOVER TO FACTORY CONTENTS in Access IBM Predesktop Area. 3. If item 2 failed, press F3 in the welcome screen in RECOVER TO FACTORY CONTENTS Run FDISK, and then delete all partitions. Run RECOVER TO FACTORY CONTENTS in Access IBM Predesktop Area again. 4. If item 3 failed, select CD-ROM boot in RECOVER TO FACTORY CONTENTS Run FDISK, and then delete all partitions. Run Startup in Access IBM Predesktop Area. Boot from Recovery CD and perform full recovery from it. 5. If item 4 failed, replace the hard disk drive.

Error messages

Symptom or error	FRU or action, in sequence
Device address conflict.	1. Load “Setup Defaults” in IBM BIOS Setup Utility. 2. Backup battery. 3. System board.
Allocation error for device.	1. Load “Setup Defaults” in IBM BIOS Setup Utility. 2. Backup battery. 3. System board.
Failing bits: nnnn.	1. DIMM. 2. System board.
Invalid system configuration data.	1. DIMM. 2. System board.
I/O device IRQ conflict.	1. Load “Setup Defaults” in IBM BIOS Setup Utility. 2. Backup battery. 3. System board.
Operating system not found.	1. Check that the operating system has no failure and is installed correctly. 2. Enter IBM BIOS Setup Utility and see whether the hard disk drive and the diskette drive are properly identified. 3. Reseat the hard disk drive. 4. Reinstall the operating system. 5. Diskette drive. 6. Hard disk drive. 7. System board.
Hibernation error.	1. Restore the system configuration to what it was before the computer entered hibernation mode. 2. If memory size has been changed, re-create the hibernation file.
Fan error.	Fan.
Thermal sensing error.	System board.

Beep symptoms

Symptom or error	FRU or action, in sequence
One beep and a blank, unreadable, or flashing LCD.	1. Reseat the LCD connector. 2. LCD assembly. 3. External CRT. 4. System board.
One long and two short beeps, and a blank or unreadable LCD.	1. System board. 2. LCD assembly. 3. DIMM.
Two short beeps with error codes.	POST error. See “Numeric error codes” on page 50.
Two short beeps and a blank screen.	1. System board. 2. DIMM.
Three short beeps, pause, three more short beeps, and one short beep.	1. DIMM. 2. System board
One short beep, pause, three short beeps, pause, three more short beeps, and one short beep.	
Only cursor appears.	Reinstall operating system.
Five short beeps and a blank screen.	System board

No-beep symptoms

Symptom or error	FRU or action, in sequence
No beep, power-on indicator on, LCD blank, and no POST.	1. Make sure that every connector is connected tightly and correctly. 2. DIMM. 3. System board.
No beep, power-on indicator on, and LCD blank during POST.	1. Reseat DIMM. 2. System board.
The power-on password prompt appears.	A power-on password or a supervisor password is set. Type the password and press Enter .
The hard disk password prompt appears.	A hard disk password is set. Type the password and press Enter .
The DOS full screen looks smaller.	Start the ThinkPad Configuration program and set the Screen expansion function.

LCD-related symptoms

Important

The TFT LCD for the notebook computer contains many thin-film transistors (TFTs). A small number of dots that are missing, discolored, or always lighted is characteristic of TFT LCD technology, but excessive pixel problems can cause viewing concerns. The LCD should be replaced if the number of missing, discolored, or lighted dots in any background is:

- **XGA:** 8 or more bright dots, 8 or more dark dots, or a total of 9 or more bright and dark dots.
- **SXGA+:** 11 or more bright dots, 13 or more dark dots, or a total of 16 or more bright and dark dots.

Note: A bright dot means a pixel is always on (white or color.) A dark dot means a pixel is always off (black color.)

Symptom or error	FRU or action, in sequence
No beep, power-on indicator on, and a blank LCD during POST.	System board.
• LCD backlight not working. • LCD too dark. • LCD brightness cannot be adjusted. • LCD contrast cannot be adjusted.	1. Reseat the LCD connectors. 2. LCD assembly. 3. System board.
• LCD screen unreadable. • Characters missing pixels. • Screen abnormal. • Wrong color displayed.	1. See important note for “LCD-related symptoms.” 2. Reseat all LCD connectors. 3. LCD assembly. 4. System board.
Horizontal or vertical lines displayed on LCD.	LCD assembly.

Intermittent problems

Intermittent system hang problems can be due to a variety of causes that have nothing to do with a hardware defect, such as cosmic radiation, electrostatic discharge, or software errors. FRU replacement should be considered only when a problem recurs.

When analyzing an intermittent problem, do the following:

1. Run the diagnostic test for the system board in loop mode **at least 10 times**.
2. If no error is detected, do **not** replace any FRUs.
3. If any error is detected, replace the FRU shown by the FRU code. Rerun the test to verify that no more errors exist.

Undetermined problems

You are here because the diagnostic tests did not identify which adapter or device failed, wrong devices are installed, a short circuit is suspected, or the system is inoperative. Follow these procedures to isolate the failing FRU (do not isolate FRUs that have no defects).

Verify that all attached devices are supported by the computer.

Verify that the power supply being used at the time of the failure is operating correctly. (See “Power system checkout” on page 37.)

1. Power off the computer.
2. Visually check each FRU for damage. Replace any damaged FRU.
3. Remove or disconnect all of the following devices:
 - a. Non-IBM devices
 - b. Printer, mouse, and other external devices
 - c. Battery pack
 - d. Hard disk drive
 - e. External diskette drive
 - f. DIMM
 - g. CD-ROM and diskette drive
 - h. PC Cards
4. Power on the computer.
5. Determine whether the problem has changed.
6. If the problem does not recur, reconnect the removed devices one at a time until you find the failing FRU.
7. If the problem remains, replace the following FRUs one at a time (do not replace a nondefective FRU):
 - a. System board
 - b. LCD assembly

FRU replacement notices

This section contains notices related to removing and replacing parts. Read this section carefully before replacing any FRU.

Screw notices

Loose screws can cause a reliability problem. In IBM ThinkPad computers, this problem is addressed with special nylon-coated screws that have the following characteristics:

- They maintain tight connections.
- They do not easily come loose, even with shock or vibration.
- They are harder to tighten.
- They should be used only once.

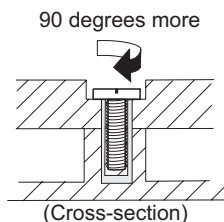
Do the following when you service this machine:

- Keep the screw kit (for the P/N, see “Miscellaneous parts” on page 124) in your tool bag.
- Always use new screws.
- Use a torque screwdriver if you have one.

Tighten screws as follows:

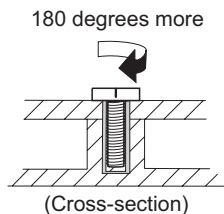
- **Plastic to plastic**

Turn an additional **90 degrees** after the screw head touches the surface of the plastic part:



- **Logic card to plastic**

Turn an additional **180 degrees** after the screw head touches the surface of the logic card:



- **Torque driver**

If you have a torque driver, refer to the “Torque” column for each step.

- Make sure you use the correct screw. If you have a torque screwdriver, tighten all screws firmly to the torque shown in the table. **Never use a screw that you removed. Use a new one. Make sure the screws are tightened firmly.**

Retaining serial numbers

This section includes the following descriptions:

- “Restoring the serial number of the system unit”
- “Retaining the UUID”

Restoring the serial number of the system unit

When the computer was manufactured, the EEPROM on the system board was loaded with the serial numbers of the system and all major components. These numbers need to remain the same throughout the life of the computer.

If you replace the system board, you must restore the serial number of the system unit to its original value.

Before replacing the system board, save the original serial number by doing the following:

1. Install the ThinkPad hardware maintenance diskette version 1.69 or later, and restart the computer.
2. From the main menu, select **1. Set System Identification**.
3. Select **2. Read S/N data from EEPROM**.

The serial number for each device is displayed. Write down the serial number of the system unit, designated as follows:

20: System unit serial number

After you have replaced the system board, restore the serial number by doing the following:

1. Install the ThinkPad hardware maintenance diskette version 1.69 or later and restart the computer.
2. From the main menu, select **1. Set system identification**.
3. Select **1. Add S/N data from EEPROM**.

Follow the instructions on the screen.

Note: The serial number of the system unit is written on the label attached on the bottom of the computer.

Retaining the UUID

The Universally Unique Identifier (UUID) is a 128-bit number uniquely assigned to your computer at production

and stored in the EEPROM of your system board. The algorithm that generates the number is designed to provide unique IDs until the year A.D. 3400. No two computers in the world have the same number.

When you replace the system board, you must set the UUID on the new system board as follows:

1. Install the ThinkPad hardware maintenance diskette version 1.69 or later, and restart the computer.
2. From the main menu, select **4. Assign UUID**.

A new UUID is created and written. If a valid UUID already exists, it is not overwritten.

Removing and replacing a FRU

This section presents directions and drawings for use in removing and replacing a FRU. Be sure to observe the following general rules:

1. Do not try to service any computer unless you have been trained and certified. An untrained person runs the risk of damaging parts.
2. Before replacing any FRU, review “FRU replacement notices” on page 58.
3. Begin by removing any FRUs that have to be removed before the failing FRU. Any such FRUs are listed at the top of the page. Remove them in the order in which they are listed.
4. Follow the correct sequence in the steps for removing the FRU, as indicated in the drawings by the numbers in square callouts.
5. When turning a screw to replace a FRU, turn it in the direction indicated by the arrow in the drawing.
6. When removing the FRU, move it in the direction indicated by the arrow in the drawing.
7. To put the new FRU in place, reverse the removal procedure and follow any notes that pertain to replacement. For information about connecting and arranging internal cables, see “Locations” on page 103.
8. When replacing a FRU, use the correct screw as shown in the procedures.

DANGER

Before removing any FRU, power off the computer, unplug all power cords from electrical outlets, remove the battery pack, and then disconnect any interconnecting cables.

Attention: Before the computer is powered on after FRU replacement, make sure that all screws, springs, and other small parts are in place and are not loose inside the computer. Verify this by shaking the computer gently and listening for rattling sounds. Metallic parts or metal flakes can cause electrical short circuits.

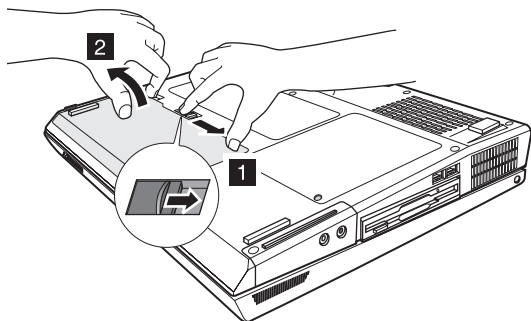
Attention: The system board is sensitive to, and can be damaged by, electrostatic discharge. Before touching it, establish personal grounding by touching a ground point with one hand or by using an electrostatic discharge (ESD) strap (P/N 6405959).

1010 Battery pack



DANGER

Use only the battery in the parts listing for the model you are servicing. Use of an incorrect battery can result in ignition or explosion of the battery.



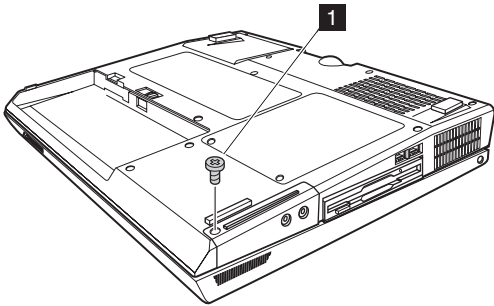
1020 Hard disk drive

Attention

- **Do not drop or apply any shock to the hard disk drive.** The hard disk drive is sensitive to physical shock. Improper handling can cause damage and permanent loss of data.
- Before removing the drive, have the user make a backup copy of all the information on the drive if possible.
- Never remove the drive while the system is operating or is in suspend mode.

For access, remove this FRU:

- “1010 Battery pack” on page 62

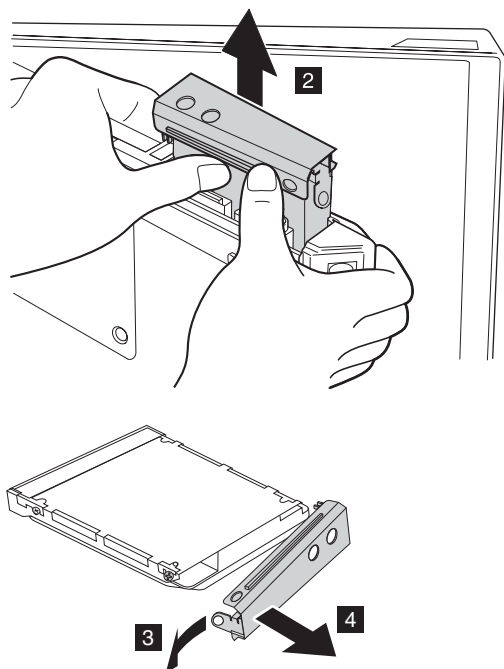


Note: The hard disk drive is attached to the cover.

Step	Screw (quantity)
1	HDD M3 × 4 mm, Black (1)
Note: Use a 2.5-mm Allen wrench to remove the security screw.	

(continued)

Removing and replacing a FRU



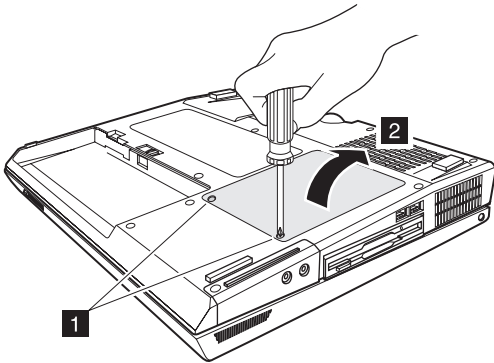
When installing: Make sure that the hard disk connector is firmly attached.

1030 DIMM door

For access, remove this FRU:

- “1010 Battery pack” on page 62

Note: Loosen the screws **1**, but do not remove them.

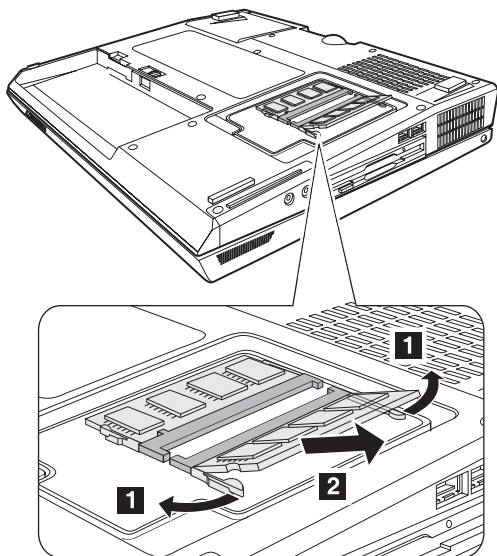


Step	Screw (quantity)	Torque
1	M2.5 captive screw (2)	Nm 0.3 Nm (3.2 kgfcm)

1040 DIMM

For access, remove these FRUs, in order:

- “1010 Battery pack” on page 62
- “1030 DIMM door” on page 65

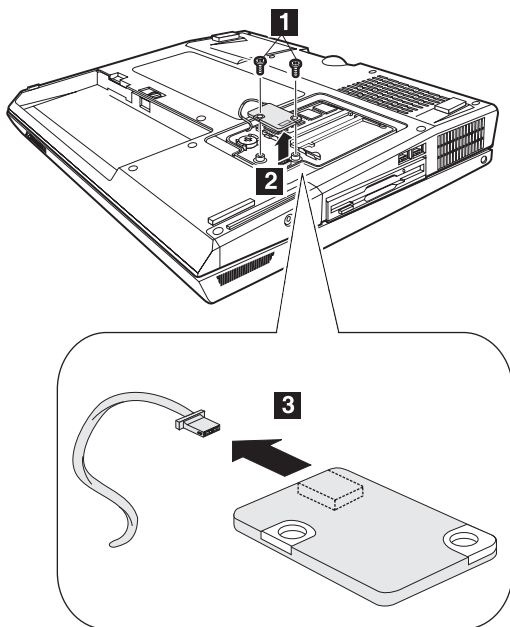


When installing: With the notched end of the DIMM toward the socket, insert the DIMM into the socket, and then press it firmly. Pivot the DIMM until it snaps into place. Make sure that the card is firmly fixed in the slot and does not move easily.

1050 Modem daughter card (MDC)

For access, remove this FRU:

- “1010 Battery pack” on page 62
- “1030 DIMM door” on page 65



Step	Screw (quantity)	Torque
1	M2.5 x 5 mm, Silver (2)	Nm 0.3 (3.2 kgfcm)

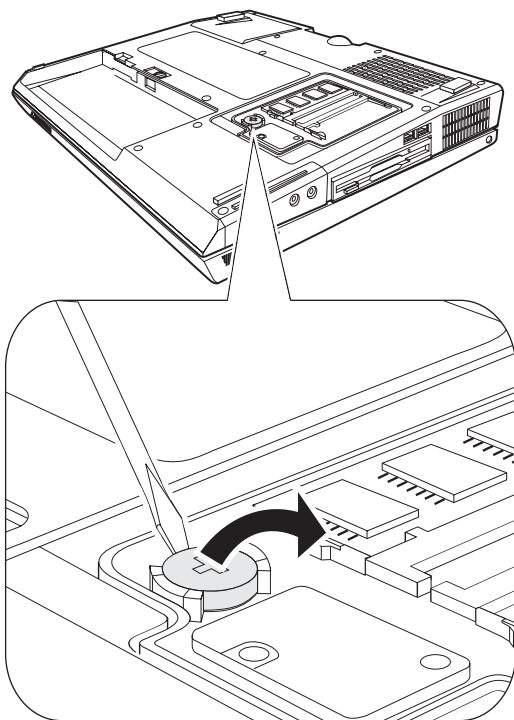
1060 Backup battery



Use only the battery in the parts listing for the computer you are servicing. Use of an incorrect battery can result in ignition or explosion of the battery.

For access, remove these FRUs, in order:

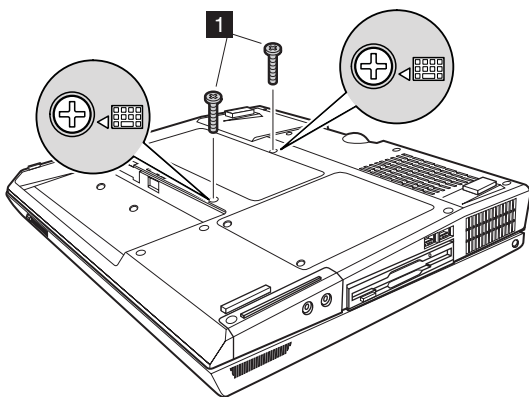
- “1010 Battery pack” on page 62
- “1030 DIMM door” on page 65



1070 Keyboard

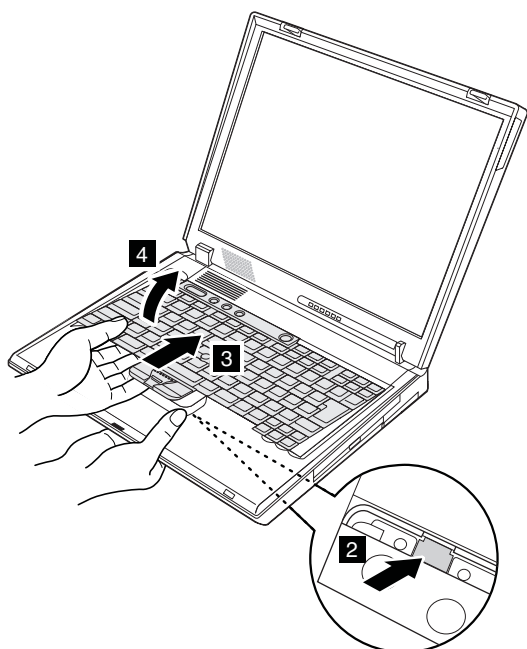
For access, remove these FRUs, in order:

- “1010 Battery pack” on page 62

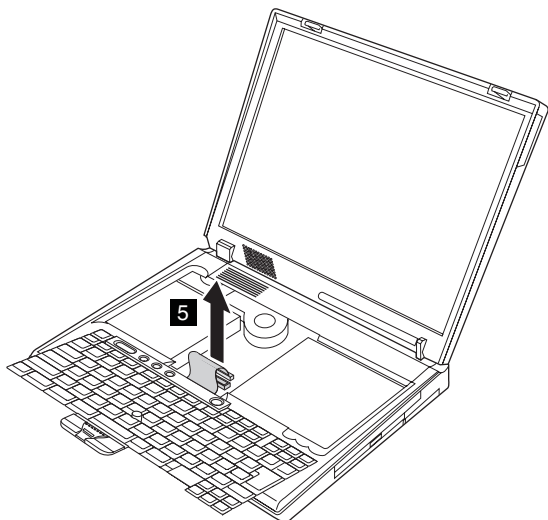


Step	Screw (quantity)	Torque
1	M2.5 × 7 mm, Black (2)	Nm 0.3 (3.2 kgfcm)

(continued)



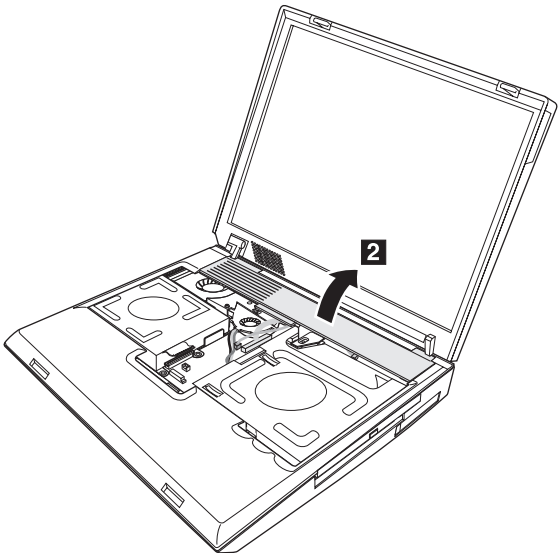
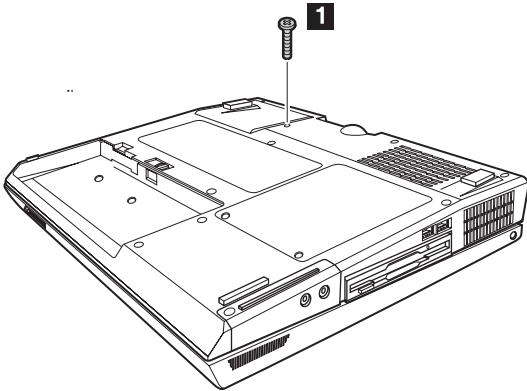
In step **2**, push the keyboard from the bottom, while at the same time pushing a little in the direction of the arrow in step **3**. Take care not to bend the keyboard when lifting it at step **4**.



1080 Middle cover

For access, remove these FRUs, in order:

- “1010 Battery pack” on page 62
- “1070 Keyboard” on page 69



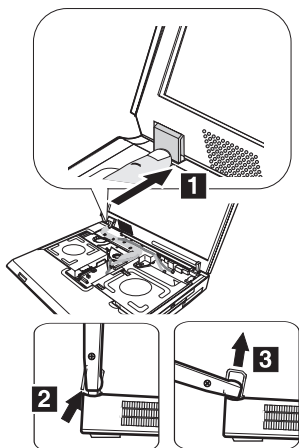
Step	Screw (quantity)	Torque
1	M2.5 × 8 mm, Black (1)	Nm 0.3 (3.2 kgfcm)

Note: The bottom-side screw that secures the middle cover may be a security or tamper-proof screw for 802.11a/b wireless models.

1090 Hinge cover

For access, remove this FRU:

- “1010 Battery pack” on page 62
- “1070 Keyboard” on page 69
- “1080 Middle cover” on page 71

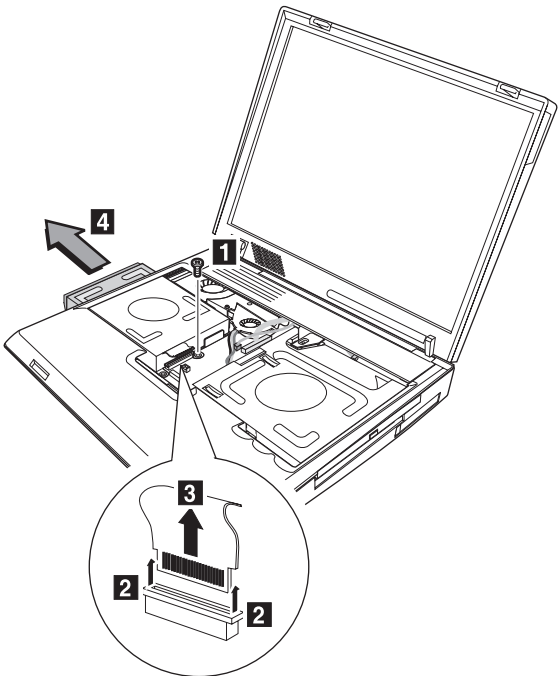


When installing: Align the hinge cover squarely and push down.

1095 FDD assembly

For access, remove these FRUs, in order:

- “1010 Battery pack” on page 62
- “1070 Keyboard” on page 69

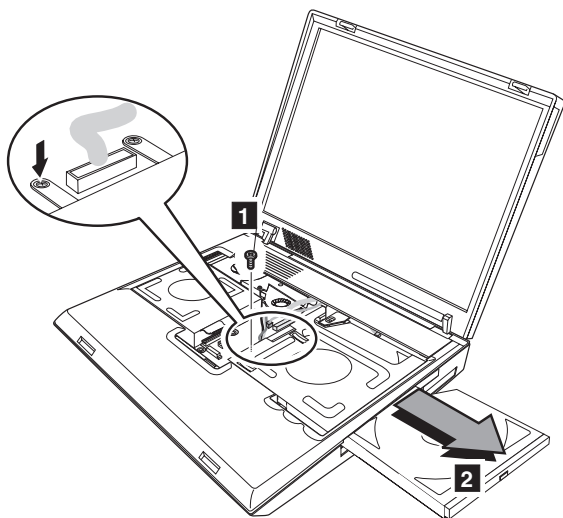


Step	Screw (quantity)	Torque
1	M2.5 × 5 mm, Silver (1)	0.3 Nm (3.2 kgfcm)

1100 CD-ROM/DVD drive

For access, remove these FRUs, in order:

- “1010 Battery pack” on page 62
- “1070 Keyboard” on page 69

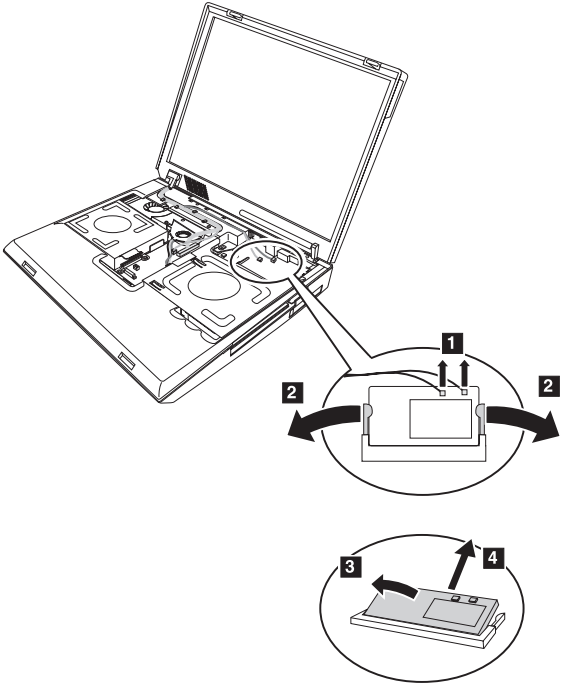


Step	Screw (quantity)	Torque
1	M2.5 stud Phillips × 5 mm, Silver (1)	0.3 Nm (3.2 kgfcm)

1110 Mini PCI adapter

For access, remove these FRUs, in order:

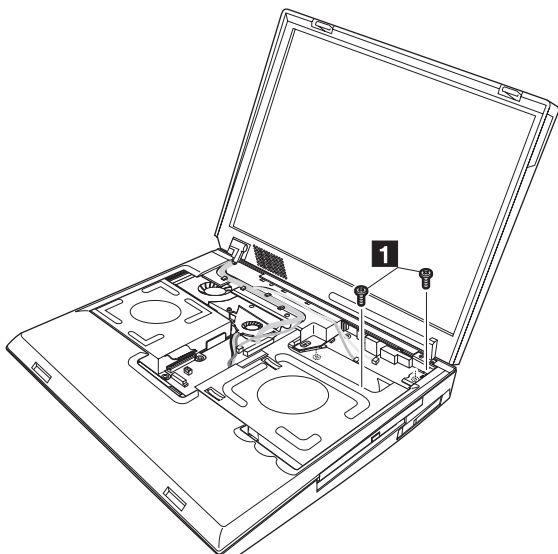
- “1010 Battery pack” on page 62
- “1070 Keyboard” on page 69
- “1080 Middle cover” on page 71



1115 PC card slot assembly

For access, remove these FRUs, in order:

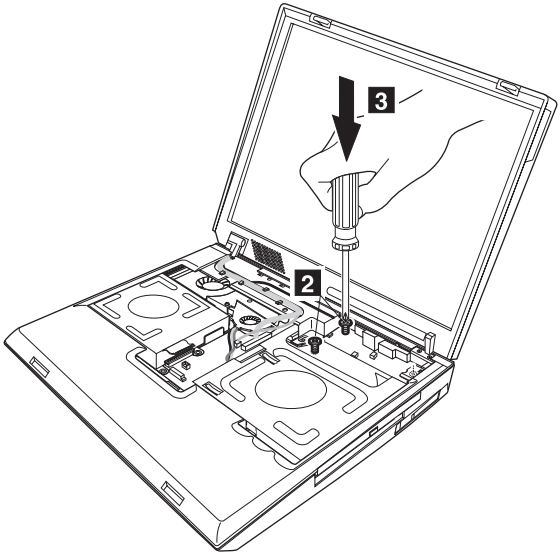
- “1010 Battery pack” on page 62
- “1030 DIMM door” on page 65
- “1070 Keyboard” on page 69
- “1080 Middle cover” on page 71
- “1090 Hinge cover” on page 72
- “1100 CD-ROM/DVD drive” on page 74
- “1110 Mini PCI adapter” on page 75



Step	Screw (quantity)	Torque
1	M2.5 × 8 mm, Black (2)	0.3 Nm (3.2 kgfcm)

(continued)

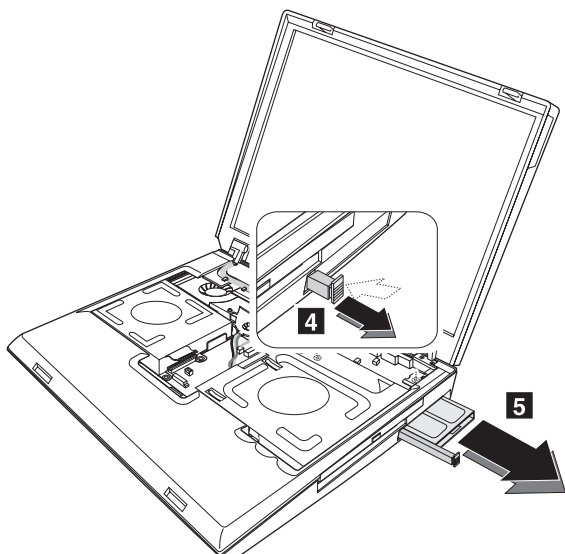
Loosen the two screws at **2** about half-way out. Then, push down firmly on both screws in the direction of the arrow **3** to disconnect the PC card from the system board.



Step	Screw (quantity)	Torque
2	M2.5 × 8 mm, Black (2)	0.3 Nm (3.2 kgfcm)

Push the PC card eject button **4** to pop the button out. While holding the PC card door down, pull on the PC card eject button and carefully remove the PC card slot assembly **5**.

(continued)

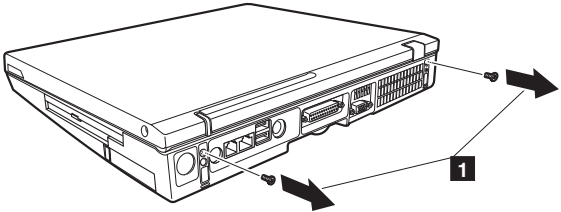


When installing: At steps **2** and **3**, tighten the two new screws slowly until both screws have caught the first threads of the screw holes on the PC card slot assembly. Then, tighten each screw one turn at a time, alternating between screws to evenly pull the assembly connector onto the system board connector.

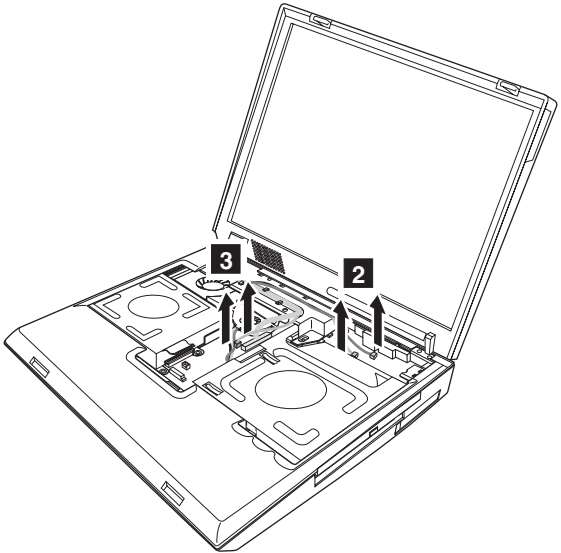
1120 LCD and Keyboard bezel assembly

For access, remove these FRUs, in order:

- “1010 Battery pack” on page 62
- “1070 Keyboard” on page 69
- “1080 Middle cover” on page 71
- “1090 Hinge cover” on page 72

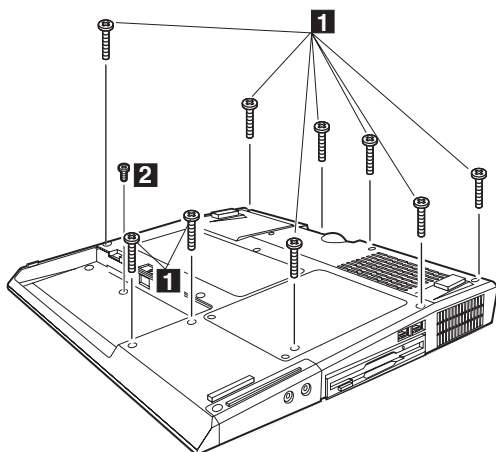


Step	Screw (quantity)	Torque
1	M2.5 × 7 mm, Black (2)	0.3 Nm (3.2 kgfcm)

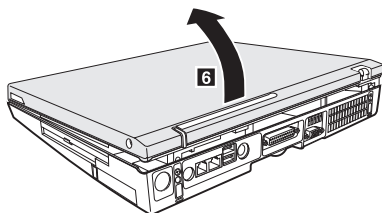


(continued)

Removing and replacing a FRU



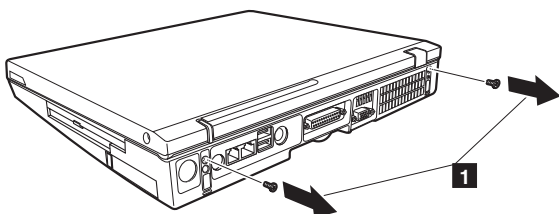
Step	Screw (quantity)	Torque
4	M 2.5 × 7 mm, Black (9)	0.3 Nm (3.2 kgfcm)
5	M 2.5 × 3 mm, Silver (1)	0.3 Nm (3.2 kgfcm)



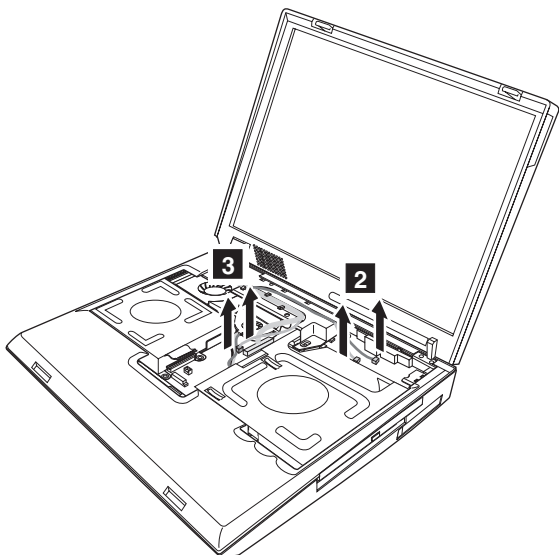
1125 LCD assembly

For access, remove these FRUs, in order:

- “1010 Battery pack” on page 62
- “1070 Keyboard” on page 69
- “1080 Middle cover” on page 71
- “1090 Hinge cover” on page 72

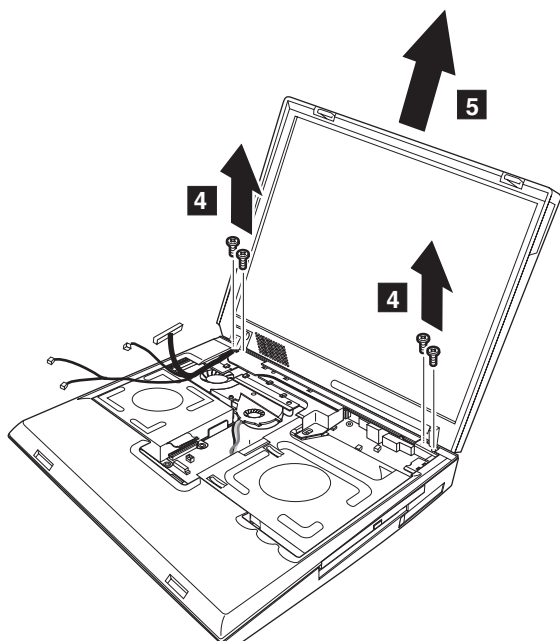


Step	Screw (quantity)	Torque
1	M2.5 × 7 mm, Black (2)	0.3 Nm (3.2 kgfcm)



(continued)

Removing and replacing a FRU

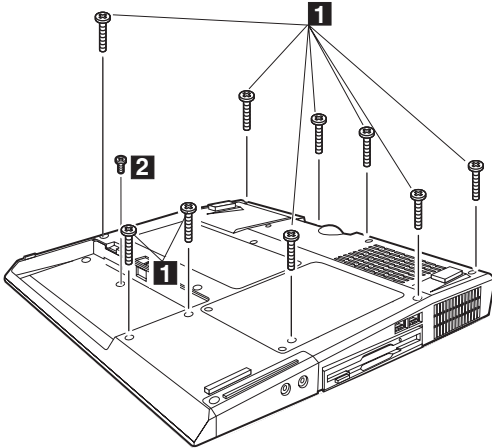


Step	Screw (quantity)	Torque
4	M 2.5 × 7 mm, Silver (4)	0.3 Nm (3.2 kgfcm)

1130 Keyboard bezel

For access, remove these FRUs, in order:

- “1010 Battery pack” on page 62
- “1030 DIMM door” on page 65
- “1070 Keyboard” on page 69
- “1080 Middle cover” on page 71
- “1090 Hinge cover” on page 72
- “1125 LCD assembly” on page 81

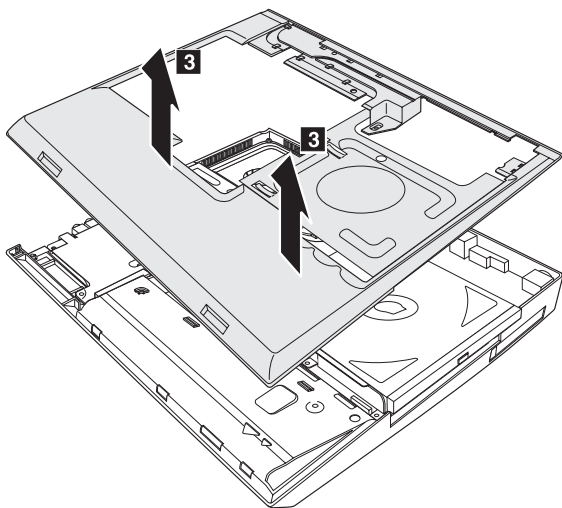


Step	Screw (quantity)	Torque
1	M 2.5 × 7 mm, Black (9)	0.3 Nm (3.2 kgfcm)
2	M 2.5 × 3 mm, Silver (1)	0.3 Nm (3.2 kgfcm)

(continued)

Removing and replacing a FRU

Remove the keyboard bezel in the direction of arrow **3**.

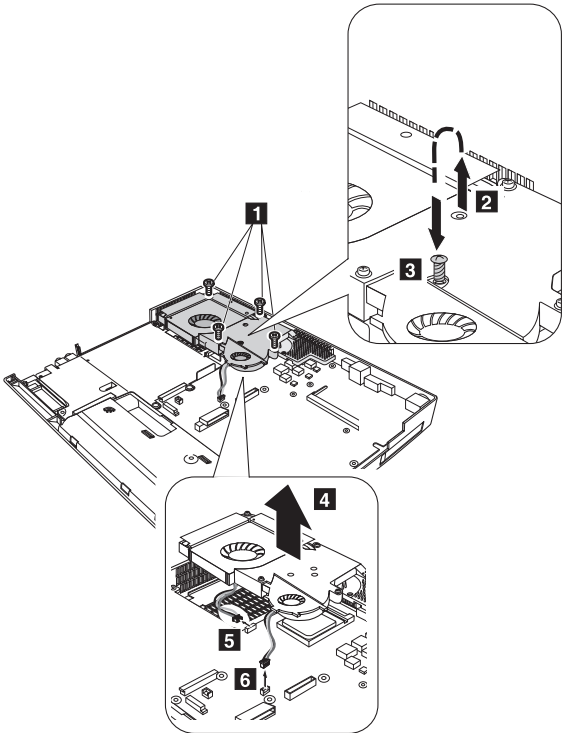


1140 Fan assembly

For access, remove these FRUs, in order:

- “1010 Battery pack” on page 62
- “1030 DIMM door” on page 65
- “1070 Keyboard” on page 69
- “1080 Middle cover” on page 71
- “1090 Hinge cover” on page 72
- “1120 LCD and Keyboard bezel assembly” on page 79

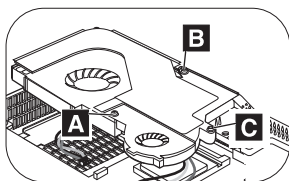
To prevent the CPU from being pulled from the socket when the fan is removed, remove the screw **2** and reinsert it **3**. Then carefully turn the screw to separate the fan as you lift up **4**.



Step	Screw (quantity)	Torque
1	M2.5 captive × (4)	0.3 Nm (3.2 kgfcm)

(continued)

When installing: Apply 1 gram (approx.) of thermal grease to the underside of the fan assembly, spreading it evenly with the provided spatula. Do not apply thermal grease directly to the CPU. Then, when the fan is in place, tighten the screws in this order: **A** ; **B** ; and **C** .



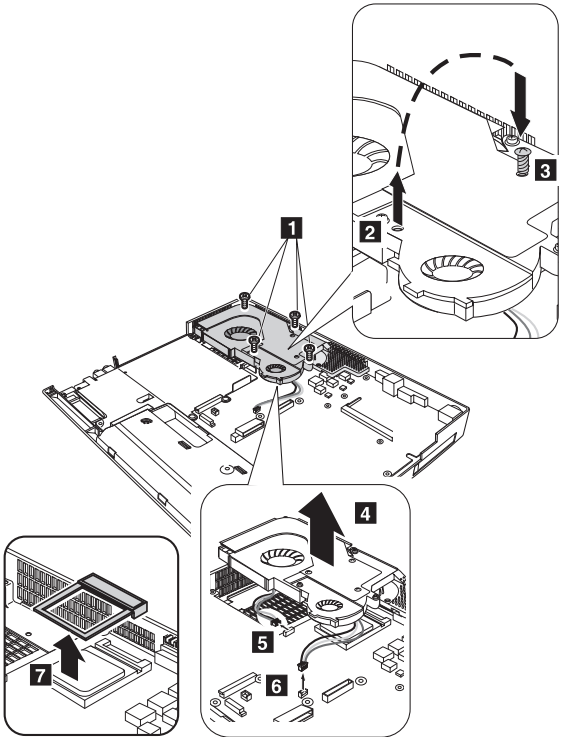
Caution: When installing, be sure the screw that was moved from position **2** to **3** above, is returned to its original location.

1145 Fan (CPU 3 GHz) and CPU fixture

For access, remove these FRUs, in order:

- “1010 Battery pack” on page 62
- “1030 DIMM door” on page 65
- “1070 Keyboard” on page 69
- “1080 Middle cover” on page 71
- “1090 Hinge cover” on page 72
- “1120 LCD and Keyboard bezel assembly” on page 79

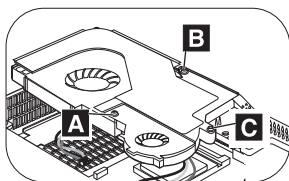
To prevent the CPU from being pulled from the socket when the fan is removed, remove the screw **2** and reinsert it **3**. Then carefully turn the screw to separate the fan as you lift up **4**.



Step	Screw (quantity)	Torque
1	M2.5 captive × (4)	0.3 Nm (3.2 kgfcm)

(continued)

When installing: Apply 1 gram (approx.) of thermal grease to the underside of the fan assembly, spreading it evenly with the provided spatula. Do not apply thermal grease directly to the CPU. Then, when the fan is in place, tighten the screws in this order: **A** ; **B** ; and **C** .



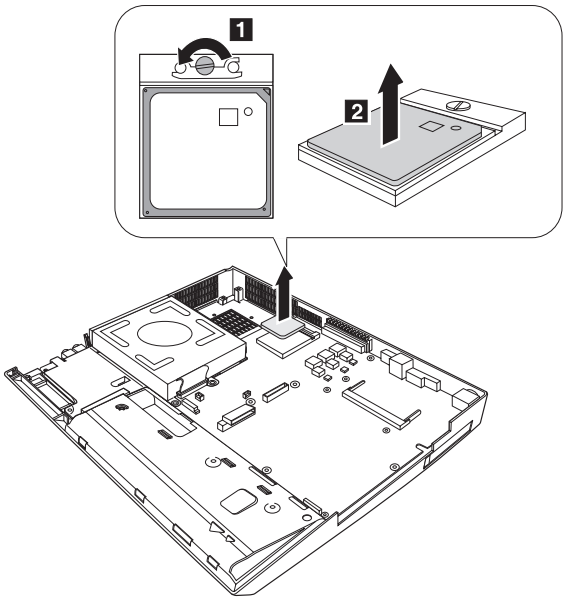
Caution: When installing, be sure the screw that was moved from position **2** to **3** above, is returned to its original location.

1150 CPU

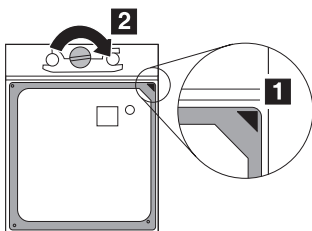
For access, remove these FRUs, in order:

- “1010 Battery pack” on page 62
- “1030 DIMM door” on page 65
- “1070 Keyboard” on page 69
- “1080 Middle cover” on page 71
- “1090 Hinge cover” on page 72
- “1120 LCD and Keyboard bezel assembly” on page 79
- “1140 Fan assembly” on page 85
- “1145 Fan (CPU 3 GHz) and CPU fixture” on page 87

Rotate the head of the screw in the direction of the arrow **1** to release the lock; then remove the CPU **2**.



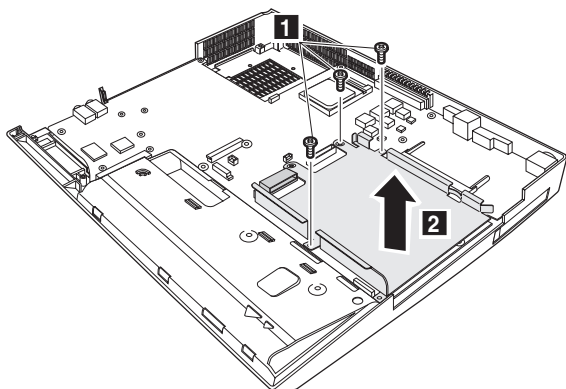
When installing: Place the CPU on the CPU socket with the pin 1 corner as shown **1**, and then rotate the head of the screw in the direction of the arrow **2** to secure the CPU.



1160 CD-ROM/DVD drive bracket

For access, remove these FRUs, in order:

- “1010 Battery pack” on page 62
- “1030 DIMM door” on page 65
- “1070 Keyboard” on page 69
- “1080 Middle cover” on page 71
- “1090 Hinge cover” on page 72
- “1120 LCD and Keyboard bezel assembly” on page 79

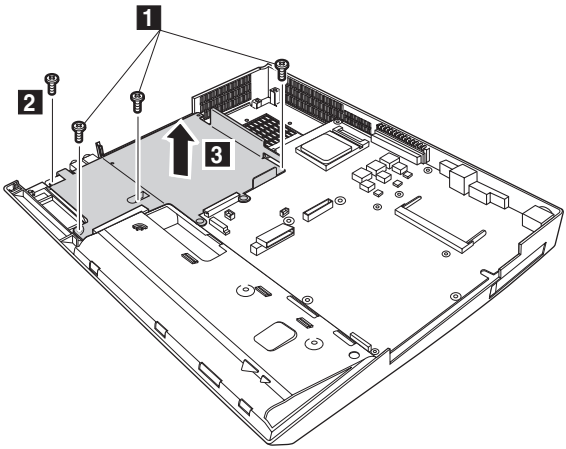


Step	Screw (quantity)	Torque
1	M2.5 × 5 mm, Silver (3)	0.3 Nm (3.2 kgfcm)

1170 FDD bracket

For access, remove these FRUs, in order:

- “1010 Battery pack” on page 62
- “1030 DIMM door” on page 65
- “1070 Keyboard” on page 69
- “1080 Middle cover” on page 71
- “1090 Hinge cover” on page 72
- “1120 LCD and Keyboard bezel assembly” on page 79
- “1095 FDD assembly” on page 73

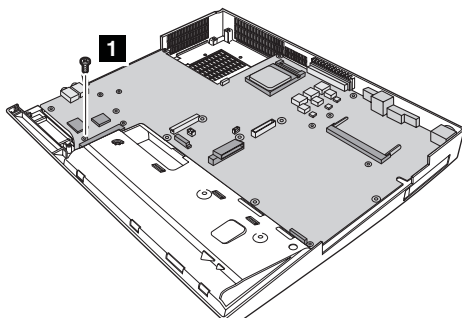


Step	Screw (quantity)	Torque
1	M2.5 × 5 mm, Silver (3)	0.3 Nm (3.2 kgfcm)
2	M2.5 × 3 mm, Silver (1)	0.3 Nm (3.2 kgfcm)

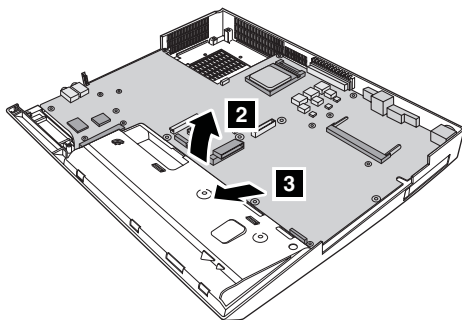
1180 System board

For access, remove these FRUs, in order:

- “1010 Battery pack” on page 62
- “1030 DIMM door” on page 65
- “1070 Keyboard” on page 69
- “1080 Middle cover” on page 71
- “1090 Hinge cover” on page 72
- “1100 CD-ROM/DVD drive” on page 74
- “1110 Mini PCI adapter” on page 75
- “1120 LCD and Keyboard bezel assembly” on page 79
- “1140 Fan assembly” on page 85
- “1150 CPU” on page 89
- “1145 Fan (CPU 3 GHz) and CPU fixture” on page 87
- “1160 CD-ROM/DVD drive bracket” on page 90
- “1095 FDD assembly” on page 73
- “1170 FDD bracket” on page 91



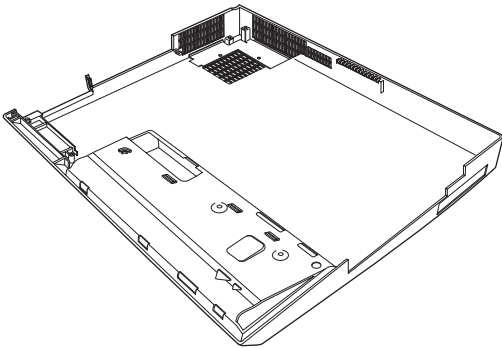
Step	Screw (quantity)	Torque
1	M2.5 × 5 mm, Silver (2)	0.3 Nm (3.2 kgfcm)



1190 Lower case assembly

For access, remove these FRUs, in order:

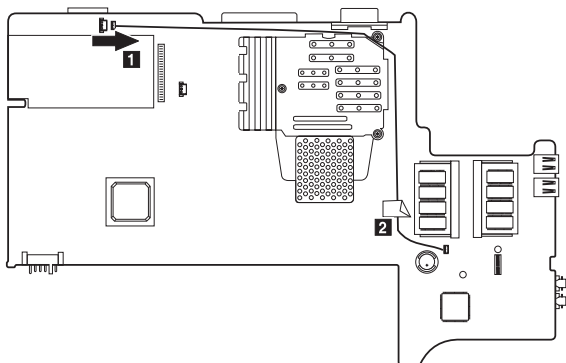
- “1010 Battery pack” on page 62
- “1030 DIMM door” on page 65
- “1070 Keyboard” on page 69
- “1080 Middle cover” on page 71
- “1090 Hinge cover” on page 72
- “1100 CD-ROM/DVD drive” on page 74
- “1110 Mini PCI adapter” on page 75
- “1120 LCD and Keyboard bezel assembly” on page 79
- “1160 CD-ROM/DVD drive bracket” on page 90
- “1095 FDD assembly” on page 73
- “1170 FDD bracket” on page 91
- “1180 System board” on page 92



1195 Modem cable

For access, remove these FRUs, in order:

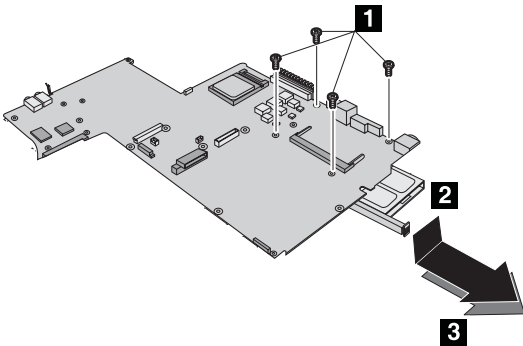
- “1010 Battery pack” on page 62
- “1030 DIMM door” on page 65
- “1070 Keyboard” on page 69
- “1080 Middle cover” on page 71
- “1090 Hinge cover” on page 72
- “1110 Mini PCI adapter” on page 75
- “1100 CD-ROM/DVD drive” on page 74
- “1110 Mini PCI adapter” on page 75
- “1125 LCD assembly” on page 81
- “1130 Keyboard bezel” on page 83
- “1160 CD-ROM/DVD drive bracket” on page 90
- “1095 FDD assembly” on page 73
- “1170 FDD bracket” on page 91
- “1180 System board” on page 92



2000 PC card slot assembly

For access, remove these FRUs, in order:

- “1010 Battery pack” on page 62
- “1030 DIMM door” on page 65
- “1070 Keyboard” on page 69
- “1080 Middle cover” on page 71
- “1090 Hinge cover” on page 72
- “1110 Mini PCI adapter” on page 75
- “1100 CD-ROM/DVD drive” on page 74
- “1110 Mini PCI adapter” on page 75
- “1120 LCD and Keyboard bezel assembly” on page 79
- “1160 CD-ROM/DVD drive bracket” on page 90
- “1095 FDD assembly” on page 73
- “1170 FDD bracket” on page 91
- “1180 System board” on page 92



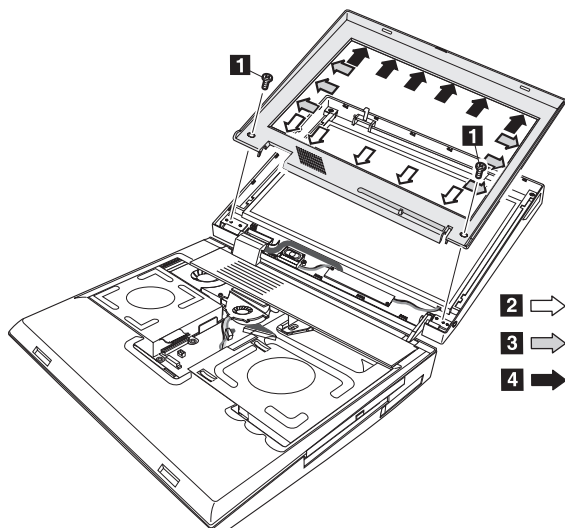
Step	Screw (quantity)	Torque
1	M2.5 × 8 mm, Silver (4)	0.3 Nm (3.2 kgfcm)

2010 LCD front bezel

For access, remove this FRU:

- “1010 Battery pack” on page 62

After removing screws **1**, detach all of the latches **2** to **4** in order.



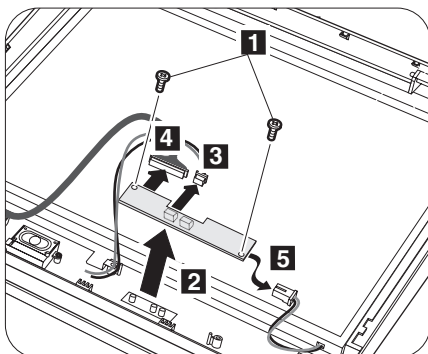
Step	Screw (quantity)	Torque
1	M2.5 × 5 mm, Black (2)	0.3 Nm (3.2 kgfcm)

When installing: Make sure that all of the latches of the LCD front bezel are firmly attached to the LCD cover.

2020 Inverter card

For access, remove these FRUs, in order:

- “1010 Battery pack” on page 62
- “2010 LCD front bezel” on page 96



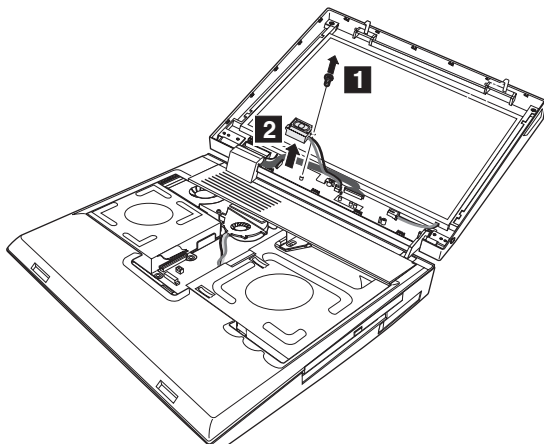
Step	Screw (quantity)	Torque
1	M2.5 × 5 mm, Silver (2)	0.3 Nm (3.2 kgfcm)

When installing: Make sure that connectors **3**, **4** and **5** are firmly attached. And make sure connector **3** is connected to the socket on the left.

2030 Speaker assembly

For access, remove these FRUs, in order:

- “1010 Battery pack” on page 62
- “2010 LCD front bezel” on page 96
- “2020 Inverter card” on page 97

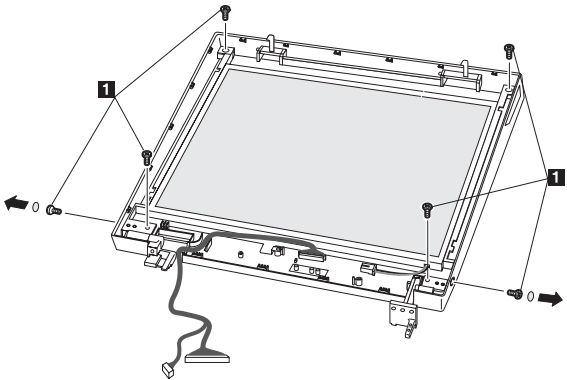


Step	Screw (quantity)	Torque
1	M2.5 × 5 mm, Silver (1)	0.3 Nm (3.2 kgfcm)

2040 LCD cable assembly

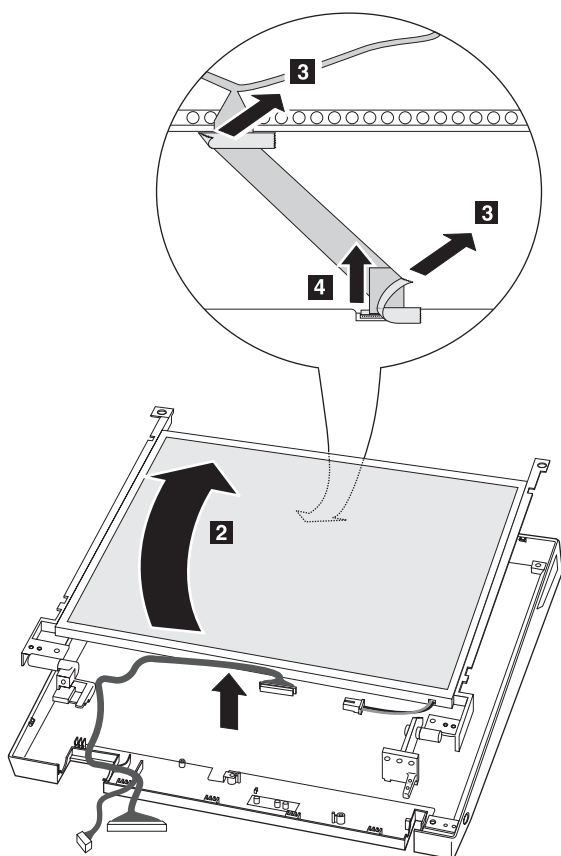
For access, remove these FRUs, in order:

- “1010 Battery pack” on page 62
- “1030 DIMM door” on page 65
- “1070 Keyboard” on page 69
- “1080 Middle cover” on page 71
- “1090 Hinge cover” on page 72
- “1125 LCD assembly” on page 81
- “2010 LCD front bezel” on page 96
- “2020 Inverter card” on page 97
- “2030 Speaker assembly” on page 98



Step	Screw (quantity)	Torque
1	M2.5 × 5 mm, Silver (6)	0.3 Nm (3.2 kgfcm)

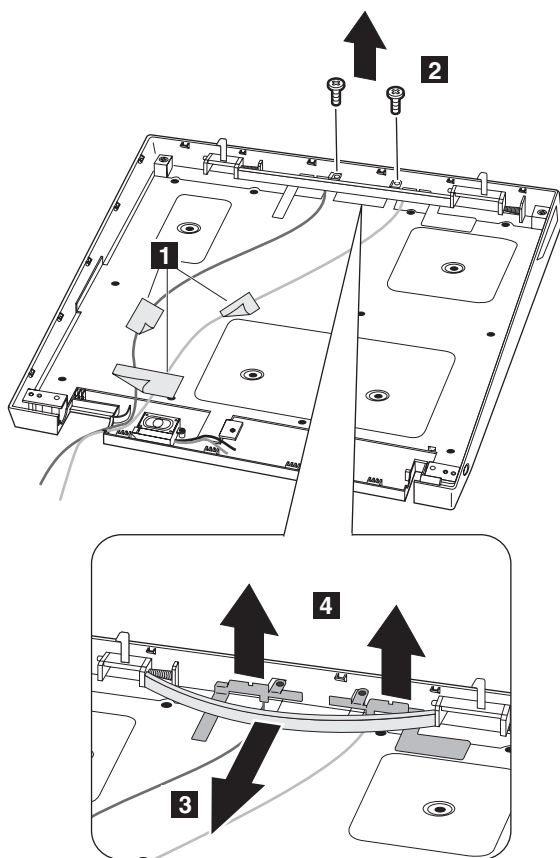
(continued)



2045 Wireless antenna and rear cover

For access, remove these FRUs, in order:

- “1010 Battery pack” on page 62
- “1030 DIMM door” on page 65
- “1070 Keyboard” on page 69
- “1080 Middle cover” on page 71
- “1090 Hinge cover” on page 72
- “1125 LCD assembly” on page 81
- “2010 LCD front bezel” on page 96
- “2020 Inverter card” on page 97
- “2040 LCD cable assembly” on page 99

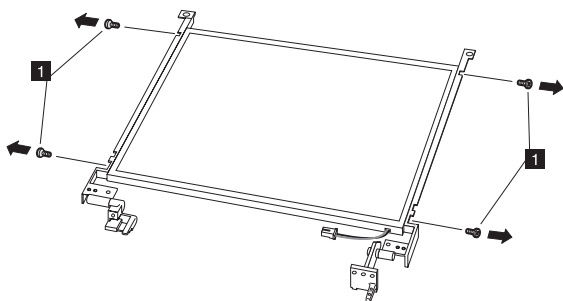


Step	Screw (quantity)	Torque
2	M2.0 × 3.5 mm, Black (2)	0.3 Nm (3.2 kgfcm)

2050 LCD panel and hinge assembly

For access, remove these FRUs, in order:

- “1010 Battery pack” on page 62
- “1070 Keyboard” on page 69
- “1090 Hinge cover” on page 72
- “1125 LCD assembly” on page 81
- “2010 LCD front bezel” on page 96
- “2020 Inverter card” on page 97
- “2040 LCD cable assembly” on page 99

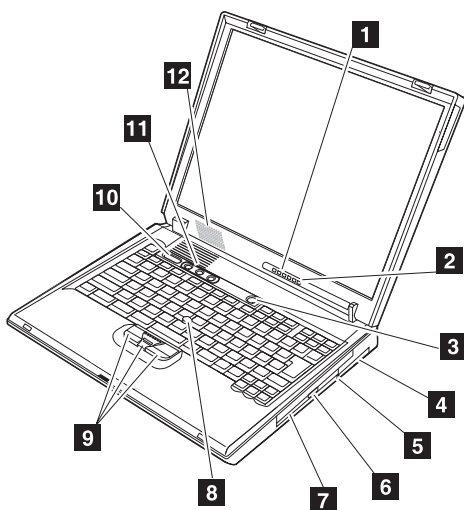


Step	Screw (quantity)	Torque
1	M2.0 × 4 mm, Silver (4)	0.25 Nm (2.5 kgfcm)

Locations

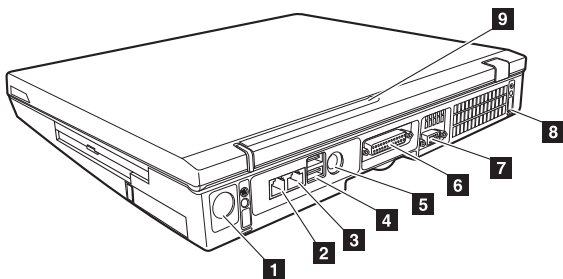
Front view

- | | |
|-----------|---------------------------|
| 1 | System status indicators |
| 2 | Power status indicators |
| 3 | Power switch |
| 4 | PC card slots |
| 5 | PC card eject button |
| 6 | CD/DVD drive eject button |
| 7 | CD/DVD drive |
| 8 | TrackPoint stick |
| 9 | TrackPoint buttons |
| 10 | Access IBM button |
| 11 | Volume control buttons |
| 12 | Monaural speaker |



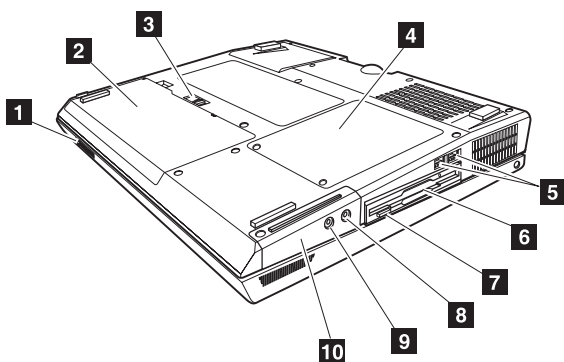
Rear view

- | | |
|---|---------------------------------------|
| 1 | AC power connector |
| 2 | Modem connector |
| 3 | Ethernet connector |
| 4 | Universal serial bus (USB) connectors |
| 5 | PS/2 connector |
| 6 | Parallel connector |
| 7 | External-monitor connector |
| 8 | Security keyhole |
| 9 | Power status indicators |



Bottom view

- | | |
|-----------|--------------------------------|
| 1 | LCD latch |
| 2 | Battery pack |
| 3 | Battery pack latch |
| 4 | DIMM slots |
| 5 | USB connectors |
| 6 | Floppy disk drive |
| 7 | Floppy disk drive eject button |
| 8 | Stereo headphone jack |
| 9 | Microphone jack |
| 10 | Hard disk drive |



Parts list

G40 series

The G40 series includes several models. The following table summarizes the characteristics of each model, to help you determine which FRU in the parts list meets your need.

Model	LCD	Bay device	Mini PCI	Battery
CPU, P4 DT Cel 2.2G/memory, 128 MB/HDD, 20 GB				
2387 79x	14.1 in, XGA	CD-ROM	Open	NiMH, 8 cell
CPU, P4 DT Cel 2.2G/memory, 128 MB/HDD, 30 GB				
2388 7Ax	14.1 in, XGA	CD-ROM	802.11b	Lithium, 6 cell
2388 7Bx				
2388 7Cx				
2388 7Fx				NiMH, 8 cell
CPU, P4 DT Cel 2.2G/memory, 256 MB/HDD, 30 GB				
2388 7Dx	14.1 in, XGA	CD-ROM	Open	Lithium, 6 cell
2388 7Gx			802.11b	NiMH, 8 cell
2388 7Jx			Open	
2388 7Zx		DVD		
2388 7Lx				Lithium, 6 cell
2388 7Hx				
2388 7Mx				Lithium, 12 cell
2388 7Nx		Combo		
2388 7Kx				NiMH, 8 cell
2388 7Yx				
CPU, P4 DT Cel 2.2G/memory, 256 MB/HDD, 40 GB				
2388 7Px	14.1 in, XGA	Combo	802.11b	Lithium, 12 cell
2388 7Qx			Open	
CPU, P4 DT Cel 2.2G/memory, 128 MB/HDD, 30 GB				
2388 8Cx	15 in, XGA	CD-ROM	Open	NiMH, 8 cell

(continued)

Model	LCD	Bay device	Mini PCI	Battery
CPU, P4 DT 2.2G/memory, 256 MB/HDD, 30 GB				
2388 8Ax	15 in, XGA	CD-ROM	Open	Lithium Ion, 6 cell
2388 8Dx		DVD	802.11b	Lithium Ion, 12 cell
2388 8Ex			Open	
2388 8Fx				
CPU, P4 DT 2.2G/memory, 256 MB/HDD, 40 GB				
2388 8Bx	15 in, XGA	CD-ROM	802.11b	Lithium Ion, 6 cell
2388 8Gx		DVD	Open	
2388 8Hx		Combo	802.11b	
2388 8Jx			Open	Lithium Ion, 12 cell
CPU, P4 DT 2.6G/memory, 128 MB/HDD, 30 GB				
2388 9Ax	14.1 in, XGA	CD-ROM	802.11b	Lithium Ion, 6 cell
2388 9Bx			Open	
2388 9Cx				
CPU, P4 DT 2.6G/memory, 256 MB/HDD, 30 GB				
2388 9Gx	14.1 in, XGA	DVD	Open	Lithium Ion, 6 cell
2388 9Dx				Lithium Ion, 12 cell
2388 9Hx				
2388 9Ex		Combo		Lithium Ion, 6 cell
2388 9Jx				Lithium Ion, 12 cell
CPU, P4 DT 2.6G/memory, 256 MB/HDD, 40 GB				
2388 9Mx	14.1 in, XGA	DVD	Open	Lithium Ion, 6 cell
2388 9Qx		Combo		
2388 9Rx			802.11b	Lithium Ion, 12 cell
2388 9Sx			Open	

(continued)

Model	LCD	Bay device	Mini PCI	Battery
CPU, P4 DT 2.6G/memory, 128 MB/HDD, 30 GB				
2388 AAx	15 in, XGA	CD-ROM	802.11b	Lithium Ion, 6 cell
2388 ABx			Open	
2388 AEx				NiMH, 8 cell
CPU, P4 DT 2.6G/memory, 256 MB/HDD, 30 GB				
2388 ACx	15 in, XGA	CD-ROM	802.11b	NiMH, 8 cell
2388 ADx			Open	
2388 AYx				
2388 AKx		DVD		Lithium Ion, 6 cell
2388 AFx			802.11b	Lithium Ion, 12 cell
2388 AGx			Open	
2388 AMx		Combo		
2388 ANx				
2388 APx			NiMH, 8 cell	
2388 AZx				
2388 B1x	15 in, SXGA+		Lithium Ion, 12 cell	
CPU, P4 DT 2.6G/memory, 128 MB/HDD, 40 GB				
2388 AHx	15 in, XGA	CD-ROM	802.11b	Lithium Ion, 6 cell
2388 AJx			Open	
CPU, P4 DT 2.6G/memory, 256 MB/HDD, 40 GB				
2388 ALx	15 in, XGA	DVD	Open	Lithium Ion, 6 cell
2388 AQx				
2388 AUx				Lithium Ion, 12 cell
2388 ARx		Combo		Lithium Ion, 6 cell
2388 ASx				
2388 ATx			802.11a/b	Lithium Ion, 12 cell
2388 AVx		Open		
2388 B2x		802.11b		

(continued)

Model	LCD	Bay device	Mini PCI	Battery
CPU, P4 DT 2.6G/memory, 256 MB/HDD, 40 GB				
2388 B1x-B3x	15 in, SXGA+	Combo	Open	Lithium Ion, 12 cell
CPU, P4 DT 2.6G/memory, 256 MB/HDD, 60 GB				
2388 AWx	15 in, XGA	Combo	802.11a/b	Lithium Ion, 12 cell
CPU, P4 DT 2.8G/memory, 256 MB/HDD, 40 GB				
2388 C1x	15 in, XGA	Combo	Open	Lithium Ion, 12 cell
2388 C2x				
CPU, P4 DT 3.0G/memory, 256 MB/HDD, 30 GB				
2388 BAx	14.1 in, XGA	DVD	Open	Lithium Ion, 12 cell
CPU, P4 DT 3.0G/memory, 256 MB/HDD, 40 GB				
2388 BAx - BBx	15 in, XGA	Combo	802.11b	Lithium Ion, 12 cell
2388 BCx			Open	
2388 BDx - BLx	15 in, SXGA+			
CPU, P4 DT 3.0G/memory, 256 MB/HDD, 60 GB				
2388 BDx	15 in, SXGA+	Combo	802.11a/b	Lithium Ion, 12 cell
2388 BEx				
2388 BFx			Open	
2388 BMx				
CPU, P4 DT 3.0G/memory, 512 MB/HDD, 60 GB				
2388 BNx	15 in, SXGA+	Combo	802.11a/b	Lithium Ion, 12 cell
CPU, P4 DT Cel 2.2G/memory, 256 MB/HDD, 30 GB				
2389 7Ex	14.1 in, XGA	CD-ROM	802.11a/b	Lithium Ion, 12 cell
2389 7Jx			Open	NiMH, 8 cell
2389 7Zx				
2389 7Kx		Combo		
2389 7Yx				

(continued)

Parts list

Model	LCD	Bay device	Mini PCI	Battery
CPU, P4 DT 2.6G/memory, 256 MB/HDD, 30 GB				
2389 9Fx	14.1 in, XGA	CD-ROM	802.11a/b	Lithium Ion, 12 cell
2389 ACx	15 in, XGA		Open	NiMH, 8 cell
2389 ADx				
2389 AYx				
2389 APx				
2389 AZx		Combo		
CPU, P4 DT 2.6G/memory, 256 MB/HDD, 40 GB				
2389 AWx - ATx	15 in, XGA	Combo	802.11a/b	Lithium Ion, 12 cell
2388 99x	14.1, XGA	Combo	Open	
2388 A8x	15 in, XGA			
2388 A9x				
CPU, P4 DT 2.2G/memory, 256 MB/HDD, 30 GB				
2388 88x	15 in, XGA	DVD	Open	Lithium Ion, 12 cell
2388 89x				
CPU, P4 DT 2.2G/memory, 256 MB/HDD, 30 GB				
2388 A7x	15 in, XGA	DVD	Open	Lithium Ion, 12 cell
CPU, P4 DT 3.0G/memory, 256 MB/HDD, 40 GB				
2388 B8x	15 in, XGA	Combo	802.11a/b	Lithium Ion, 12 cell
2388 B9x			Open	
CPU, P4 DT 2.2G/memory, open/HDD, open				
2388 CAx	14.1 in, XGA	Open	802.11a/b	Open
2388 CBx			Open	

(continued)

Model	LCD	Bay device	Mini PCI	Battery
CPU, P4 DT 2.6G/memory, open/HDD, open				
2388 CJx	14.1 in, XGA	Open	802.11a/b	Open
2388 CKx			Open	
2388 CCx	15 in, XGA		802.11a/b	
2388 CDx			Open	
CPU, P4 DT Cel 2.2G/memory, open/HDD, 30 GB				
2389 CEx	14.1 in, XGA	Open	802.11b	NiMH, 8 cell
2389 CFx			Open	
CPU, P4 DT 2.6G/memory, open/HDD, 30 GB				
2389 CGx	15 in, XGA	Open	802.11b	NiMH, 8 cell
2389 CHx			Open	

(continued)

- Each FRU is available for all types or models, unless specific types or models are given.
- The parts that are CRUs (customer replaceable units) are identified by an N, 1 or 2 in the CR id column. The N indicates the part is not a CRU. The 1 indicates the part is a Tier 1 CRU and the 2 indicates the part is a Tier 2 CRU.

Tier 1 CRU

(Example – mouse, external keyboard, hard disk drive with coin screw)

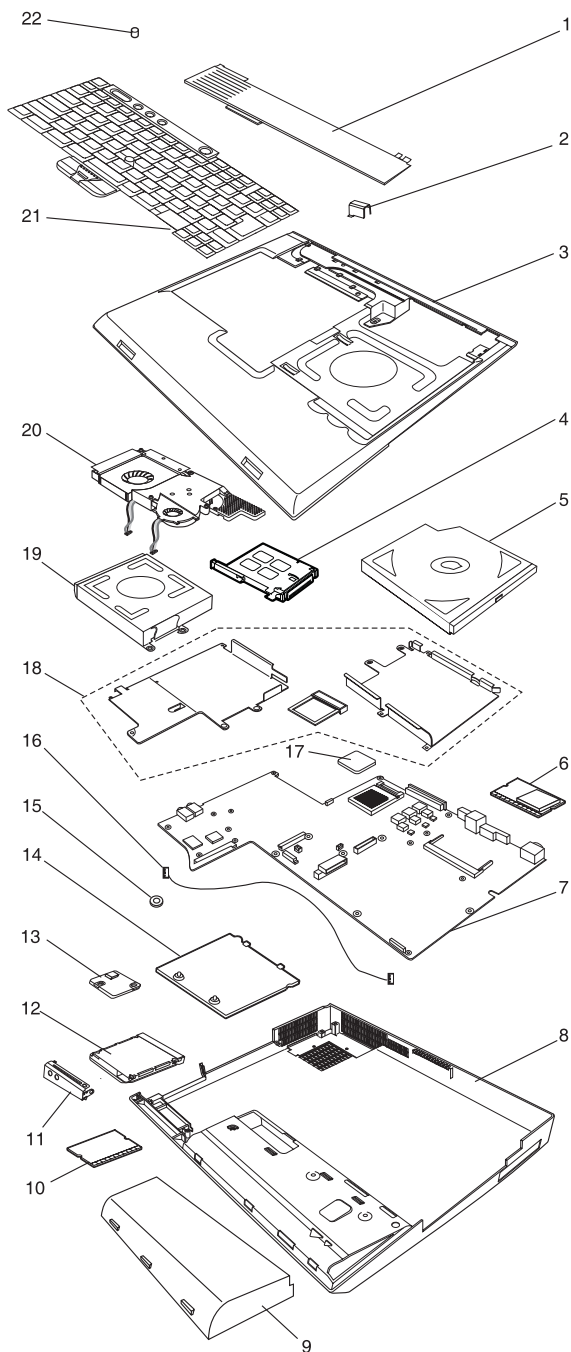
- NO TOOLS REQUIRED
- Coin, thumb screws acceptable
- Minimal technical expertise required
- Minimal problem determination (less than 5 minutes)

Tier 2 CRU

(Example – adapter card, some server and CDT, ThinkPad memory)

- Some screw/fastener removals (max. 4)
- Some technical experience required
- HelpCenter assistance may be used
- Problem determination can be done by customer either on site or with HelpCenter assistance
- FRUs marked with **OP** are available as options.

Overall



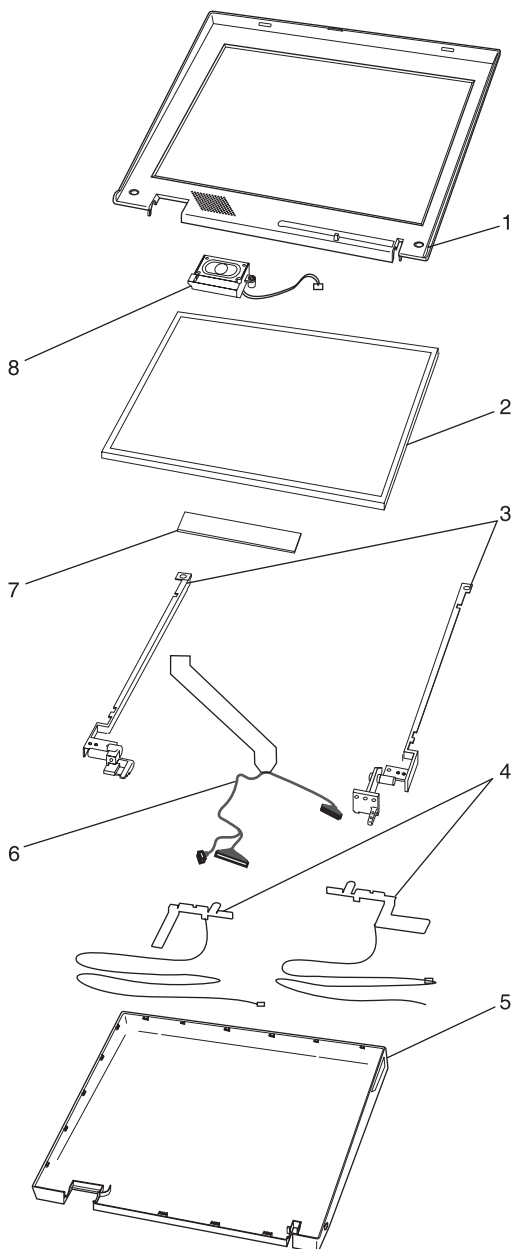
No.	FRU	P/N	CRU ID
1	Middle cover ASM	91P8539	2
2	Hinge cap	91P8533	1
3	Upper case-KBD bezel	91P8538	N
4	PC card slot	91P8537	N
5	CD-ROM TEAC CD-224E-C (bare) w/ bracket	13N6710	2
	CD-ROM HLDS CRN-8245B (bare) w/ bracket	08K9841	
	DVD MKE SR-8177 (bare) w/ bracket	08K9845	
	DVD Toshiba SD-C2612 (bare) w/ bracket	92P6037	
	Combo IV x24x10x8x24 TEAC DW-224E (bare) w/bracket	92P6016	
	Combo IV EC x24x10x8x24 TEAC DW-224A13 (bare) w/bracket	92P6105	
	Combo IV x24x10x8x24 KME UJDA-740 (bare) w/bracket	92P6065	
	Combo IV EC x24x10x8x24 KME UJDA-750 (bare) w/bracket	92P6102	
6	802.11a/b Philips Wireless Card - W/W except JP/China	91P7263	N
	802.11a/b Philips Wireless Card - Japan	26P8447	
	802.11a/b Philips Wireless Card - China	26P8446	
	802.11b Actiontec Wireless Card (Braxton)	91P7261	
7	Planar w/ bottom heatsink from 238-1xx to 238x-5xx	91P7195	N
	Planar w/ bottom heatsink from 238x-7xx to 238x-9xx and 238x-Axx to 238x-Cxx	91P7385	

No.	FRU	P/N	CRU ID
8	Lower case w/ label W/W -wireless	91P8540	N
	Lower case w/ label EMEA -wireless	91P8541	
	Lower case w/ label IIPC -wireless	91P8542	
	Lower case w/ label Korea -wireless	91P8543	
	Lower case w/ label Taiwan -wireless	91P8544	
	Lower case w/ label W/W -no wireless	91P8545	
	Lower case w/ label EMEA -no wireless	91P8546	
	Lower case w/ label IIPC -no wireless	91P8547	
	Lower case w/ label Korea -no wireless	91P8548	
	Lower case w/ label Taiwan -no wireless	91P8549	
	Lower case w/ label India-all models	91P8550	
	Lower case w/ label wireless and model related	91P8625	
	Lower case w/ label M/T 2387 W/W -no wireless	13N5263	
	Lower case w/ label M/T 2387 Taiwan -no wireless	13N5264	
	Lower case w/ label M/T 2389 W/W -wireless	13N5265	
	Lower case w/ label M/T 2384 W/W -wireless	13N5002	
	Lower case w/ label M/T 2384 W/W -no wireless	13N5038	
9	Main battery Li-Ion 4P3S Sanyo up to 2.8 GHz model	08K8179	1
	Main battery Li-Ion 4P3S Panasonic up to 2.8 GHz model	08K8181	
	Main battery Li-Ion 4P3S Sanyo 3 GHz model	92P0994	
	Main battery Li-Ion 4P3S Panasonic 3 GHz model	92P0996	
	Main battery Li-Ion 2P3S Sanyo	08K8183	
	Main battery Li-Ion 2P3S Panasonic	08K8185	
	Main battery Ni-MH 8S Sanyo	08K8187	
	Dummy battery cover	13N5218	
10	CARD ASM DDR - 128 MB	10K0029	2
	CARD ASM DDR - 256 MB	10K0031	
	CARD ASM DDR - 512 MB	10K0033	
11	HDD cover	91P8552	1

No.	FRU	P/N	CRU ID
12	HDD w/ tray & screws 20 GB Hitachi Eucalyptus	92P6017	1
	HDD w/ tray & screws 20 GB Fujitsu Hornet	92P6019	
	HDD w/ tray & screws 40 GB Hitachi Eucalyptus	92P6021	
	HDD w/ tray & screws 40 GB Fujitsu Hornet	92P6023	
	HDD w/ tray & screws 20 GB Hitachi Moraga-A	92P6086	
	HDD w/ tray & screws 30 GB Hitachi Moraga-A	92P6088	
	HDD w/ tray & screws 40 GB Hitachi Moraga-A	92P6090	
	HDD w/ tray & screws 60 GB Hitachi Moraga-A	92P6092	
	HDD w/ tray & screws 20 GB Fujitsu Vesta40	92P6094	
	HDD w/ tray & screws 30 GB Fujitsu Vesta40	92P6096	
	HDD w/ tray & screws 40 GB Fujitsu Vesta40+	92P6098	
	HDD w/ tray & screws 60 GB Fujitsu Vesta40+	92P6100	
13	CDC Modem card	91P7657	2
14	DIMM door	91P8553	1
15	RTC battery	92P0992	N
16	RJ-11 modem cable	91P6794	N
17	CPU DT-P4 Cel 2.0 GHz C1 stepping	91P7248	N
	CPU DT Cel 2.0 GHz D1 stepping	91P7399	
	CPU DT Cel 2.2 GHz D1 stepping	91P7397	
	CPU DT-P4 Cel 2.4 GHz D1 stepping	91P7398	
	CPU DT 2.4 GHz C1 stepping	91P7249	
	CPU DT-P4 2.4 GHz D1 stepping	91P7400	
	CPU DT-P4 2.6 GHz C1 stepping	91P7250	
	CPU DT-P4 2.6 GHz D1 stepping	91P7401	
	CPU DT-P4 2.8 GHz C1 stepping	91P7251	
	CPU DT-P4 2.8 GHz D1 stepping	91P7402	
	CPU DT-P4 3.0 GHz C1 stepping	91P7252	
	CPU DT-P4 3.0 GHz D1 stepping	91P7403	
18	Misc.parts kit (HDD/optical shields, CPU fixture)	91P8554	N

No.	FRU	P/N	CRU ID
19	FDD TEAC w/ bracket & screws	92P5986	N
	FDD SONY w/ bracket & screws	92P5988	
	Blank bezel FDD	13N5497	
20	Fan ASM	91P8535	N
	Fan ASM -CPU 3 GHz	91P8536	
21	Keyboard** (see “Keyboard” on page 120.)		
22	Pointing stick cap (standard)	91P9642	1
	Pointing stick cap (convex)	91P8422	
	Pointing stick cap (flare)	91P8423	
	Pointing stick cap (hair composition)	84G6535	

LCD FRUs



14.1 in. TFT

No.	FRU	P/N	CRU ID
1	LCD Bezel ASM	91P8531	N
2	LCD Panel ASM Hydis	92P6636	N
	LCD Panel ASM IDT	92P6638	
3	LCD Hinge/bracket kit	91P8532	N
4	Wireless antenna kit	91P8551	N
5	LCD Rear Cover ASM - Wireless	91P8528	N
	LCD Rear Cover ASM - no Wireless	91P8529	
6	LCD Cable ASM	91P6793	N
	LCD Cable ASM XGA HighTech	91P6820	
7	LCD Inverter/LED card Sumida	91P7197	N
	LCD Inverter/LED card Ambit	91P7281	
8	Speaker ASM	91P8198	N

15 in. TFT

No.	FRU	P/N	CRU ID
1	LCD Bezel ASM	91P8530	N
2	LCD Panel ASM XGA LGP	11P8310	N
	LCD Panel ASM XGA Hitachi	92P6657	
	LCD Panel ASM SXGA+ Samsung	92P6667	
	LCD Panel ASM SXGA+ Hitachi	92P6659	
3	LCD Hinge/bracket kit	91P8534	N
4	Wireless antenna kit	91P8551	N
5	LCD Rear Cover ASM - Wireless	91P8528	N
	LCD Rear Cover ASM - no Wireless	91P8529	
6	LCD Cable ASM XGA	91P6792	N
	LCD Cable ASM SXGA+	91P6797	
	LCD Cable ASM XGA HighTech	91P6821	
	LCD Cable ASM SXGA+ HighTech	91P6822	
7	LCD Inverter/LED card Sumida	91P7197	N
	LCD Inverter/LED card Ambit	91P7281	
8	Speaker ASM	91P8198	N

Keyboard

All of the keyboards listed below are Tier 2 CRUs (customer replaceable units).

Language	P/N (NMB)	P/N (Chicony)
Arabic	91P8172	91P8116
Belgian	91P8166	91P8110
Chinese, Traditional	91P8192	91P8136
Czech	91P8180	91P8124
Danish	91P8160	91P8104
Dutch	91P8154	91P8098
English, U.K.	91P8150	91P8094
English, U.S.	91P8152	91P8086
French, Canadian	91P8144	91P8088
French, European	91P8152	91P8096
German	91P8148	91P8092
Greek	91P8184	91P8128
Hungarian	91P8182	91P8126
Hebrew	91P8176	91P8120
Italian	91P8162	91P8106
Japanese	91P8190	91P8134
Korean	91P8194	91P8138
Norwegian	91P8158	91P8102
Portuguese	91P8170	91P8114
Russian	91P8174	91P8118
Slovakian	91P8188	91P8132
Slovenian	91P8186	91P8130
Spanish, European	91P8164	91P8108
Spanish, Latin American	91P8146	91P8090
Swedish or Finnish	91P8156	91P8100
Swiss	91P8168	91P8112
Turkish	91P8178	91P8122

Recovery CDs

All of the Recovery CDs listed below are Tier 1 CRUs (customer replaceable units).

Starting April 7, IBM will transition its Global fulfillment and distribution process for ordering (FRU Recovery CD parts) to our Authorized Replicator, who will become IBM's Supplier and Distributor for FRU Recovery CDs. Recovery CD FRU Parts will no longer be a part of Mechanicsburg or Amsterdam Inventory. The World Wide Recovery CD Initiative directs IBM ITS, BP and Service Representatives to place Recovery CDs orders for entitled customers in Canada, EMEA, LA and AP via URL:

(<http://ibmdfi.modusmedia.com>). This new process Does Not apply to US (Domestic) Recovery CDs ordering, distribution and fulfillment. Authorized Servicer Pre-Registration for the Web site order fulfillment will begin March 17 through April 5, 2003. Questions concerning the Direct Fulfillment Project for Recovery CDs fulfilled by our Supplier, is located in the Infotips Database.

For Windows XP Home Edition

Windows XP Home Edition is preinstalled as the operating system in some models.

Language	P/N
Arabic	01R7751
Chinese, Simplified	01R7940
Chinese, Traditional	01R7939
Chinese, Traditional (Hong Kong S.A.R.)	01R7941
Czech	01R7752
Danish	01R7742
Dutch	01R7749
English, U.K.	01R7740
English, U.S.	01R7739
Finnish	01R7748
French	01R7743
German	01R7744
Greek	01R7756
Hebrew	01R7753
Hungarian	01R7757
Italian	01R7747
Japanese	01R7942
Norwegian	01R7750
Polish	01R7754
Portuguese	01R7741

Parts list

Language	P/N
Russian	01R7758
Spanish	01R7745
Swedish	01R7746
Turkish	01R7755

For Windows XP professional

Windows XP Professional is preinstalled as the operating system in some models.

Language	P/N
Arabic	01R7851
Chinese, Simplified	01R7944
Chinese, Traditional	01R7943
Chinese, Traditional (Hong Kong S.A.R.)	01R7945
Czech	01R7852
Danish	01R7842
Dutch	01R7849
English, U.K.	01R7840
English, U.S.	01R7839
Finnish	01R7848
French	01R7843
German	01R7844
Greek	01R7856
Hebrew	01R7853
Hungarian	01R7857
Italian	01R7747
Japanese	01R7946
Norwegian	01R7750
Polish	01R7854
Portuguese	01R7741
Russian	01R7758
Spanish	01R7745
Swedish	01R7846
Turkish	01R7855

For Windows 2000

Windows 2000 is preinstalled as the operating system in some models.

Language	P/N
Japanese	01R7979

Miscellaneous parts

FRU	P/N
Screw kit (including nylon-coated screws)	91P8555
Rubber/mylar kit	91P8556
Thermal grease	91P9542
LG/IBM Logo kit	08K5860

AC adapters

All of the ac adapters listed below are Tier 1 CRUs (customer replaceable units).

FRU	P/N
AC ADAPTER 120W 2-prong Non-PFC Delta	02K7086
AC ADAPTER 120W 2-prong Non-PFC Liteon	02K7092
AC ADAPTER 120W 3-prong PFC Delta	02K7088
AC ADAPTER 120W 3-prong PFC Liteon	02K7094
AC ADAPTER 120W 2-prong PFC Delta	02K7090
AC ADAPTER 120W 2-prong PFC Liteon	02K7096

Telephone cable

All of the telephone cables listed below are Tier 1 CRUs (customer replaceable units).

FRU	P/N
Telephone cable (Australia)	27L0467
Telephone cable (Austria)	27L0449
Telephone cable (BE/BK/BS/BD/BF)	27L0451
Telephone cable (DK/DE/PO)	27L0447
Telephone cable (FI/NO/NS)	27L0446
Telephone cable (France)	27L0443
Telephone cable (Germany)	27L0441
Telephone cable (Italy)	27L0448
Telephone cable (ND/NU)	27L0444
Telephone cable (SF/SI/SG/SE)	27L0462
Telephone cable (Spain)	27L0450
Telephone cable (SW/SU)	27L0445
Telephone cable (UK/IR/NZ)	27L0442
Telephone cable (US/CAN/TWN/APS/LA/BRZL)	27L0465

Optional FRUs

All Optional FRUs are classified as Tier 1 CRUs (customer replaceable units).

FRU	P/N
Main Battery Li-Ion 4P3S Option	08K8178

Common parts list

Tools

Triconnector wrap plug	72X8546
PC test card	35G4703
Audio wrap cable	66G5180
USB parallel test cable	05K2580
Screwdriver kit	95F3598
Torque screwdriver	05K4695
5 mm socket wrench	05K4694
Screwdriver	27L8126
Thermal grease	91P9152
ThinkPad hardware maintenance diskette version 1.69 or later Note: Download the file from the following Web site: http://www.ibm.com/pc/partner/infotips	—

Power cords

All of the power cords listed below are Tier 1 CRUs (customer replaceable units).

IBM power cords for a specific country or region are usually available only in that country or region:

For 2-pin power cords:

Region	P/N
Canada, U.S.	13H5264
Japan	74P4331
Argentina	36L8870
Brazil	49P2095

For 3-pin power cords:

Region	P/N
Australia, New Zealand	76H3514
Canada, U.S.	76H3516
Italy	76H3530
Denmark	76H3520
U.K., China (Hong Kong S.A.R.)	76H3524
European countries	76H3518
India, South Africa	76H3522
Israel	76H3532
Korea	76H3535

Parts list

Region	P/N
China (P.R.C.) (other than Hong Kong S.A.R.)	02K0539
Switzerland	76H3528

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